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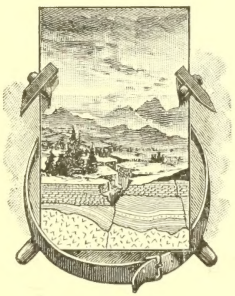
DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPERS

Nos. 287-289



WASHINGTON

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Same 289; Surface water supply of United States, 1910, pt. 9, Colorado River basin.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 287

SURFACE WATER SUPPLY OF THE UNITED STATES

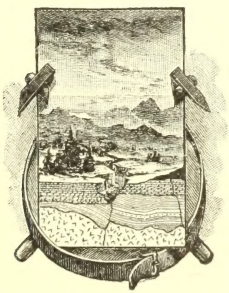
1910

PART VII. LOWER MISSISSIPPI BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. FREEMAN AND J. G. MATHERS



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1911

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SURFACE WATER SUPPLY OF THE LOWER MISSISSIPPI BASIN, 1910.

By W. B. Freeman and J. G. Mathers.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

Provided, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all streams that might be advantageously studied. The scope of the

work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins, but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years, and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a reasonable expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-

supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	....do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	.....do	1903.
W. S. 124 to 135	.....do	1904.
W. S. 165 to 178	.....do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.
W. S. 261 to 272	.....do	1909.
W. S. 281 to 292	.....do	1910.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1909. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899 [a]	1900 [b]	1901	1902	1903
Atlantic coast and eastern Gulf of Mexico:					
New England rivers	35	47	65, 75	82	97
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	32	97
Susquehanna River to York River, inclusive	35	48	65, 75	82	97
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98
Santee River to Pearl River, inclusive	36	48	65, 75	83	98
St. Lawrence River	36	49	65, 75	(82), 83	97
Hudson Bay	.....	.....	66, 75	85	100
Mississippi River:					
Ohio River	36	48, (49)	65, 75	83	98
Upper Mississippi River	36	49	65, 75	83	98, (99)
Missouri River	(36, 37)	49, (50)	66, 75	84	99
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99
Western Gulf of Mexico	37	50	66, 75	84	99
Pacific coast and Great Basin:					
Colorado River	(37), 38	50	66, 75	85	100
Great Basin	38, (39)	51	66, 75	85	100
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100
North Pacific coast	38	51	66, 75	85	100

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing results of stream measurements, 1899–1910—Continued.

	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:						
New England rivers	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	125	166	202	241	261	281
Susquehanna River to York River, inclusive	126	167	203	241	261	281
James River to Yadkin River, inclusive	126	167	203	242	262	282
Santee River to Pearl River, inclusive	127	168	204	242	262	282
St. Lawrence River	129	170	206	244	264	284
Hudson Bay	130	171	207	245	265	285
Mississippi River:						
Ohio River	128	169	205	243	263	283
Upper Mississippi River	128, (130)	171	207	245	265	285
Missouri River	130, (131)	172	208	246	266	286
Lower Mississippi River	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	132	174	210	248	268	288
Pacific coast and Great Basin:						
Colorado River	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289, (291)
Great Basin	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290, (291)
South Pacific coast to Klamath River, inclusive	134	177	213	251	271	291
North Pacific coast	135	(177), 178	214	252	272	292

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251, 271	Colorado	Yuma and Salton Sea stations repeated.
291	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for

the tributaries in regular order from source to mouth follow, all records in each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the record for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, and feet per square mile, and run-off in inches, and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents:

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water wheel realizing 80 per cent of theoretical power.}$

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting and important facts.

For each regular current-meter gaging station the following data, so far as available, are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

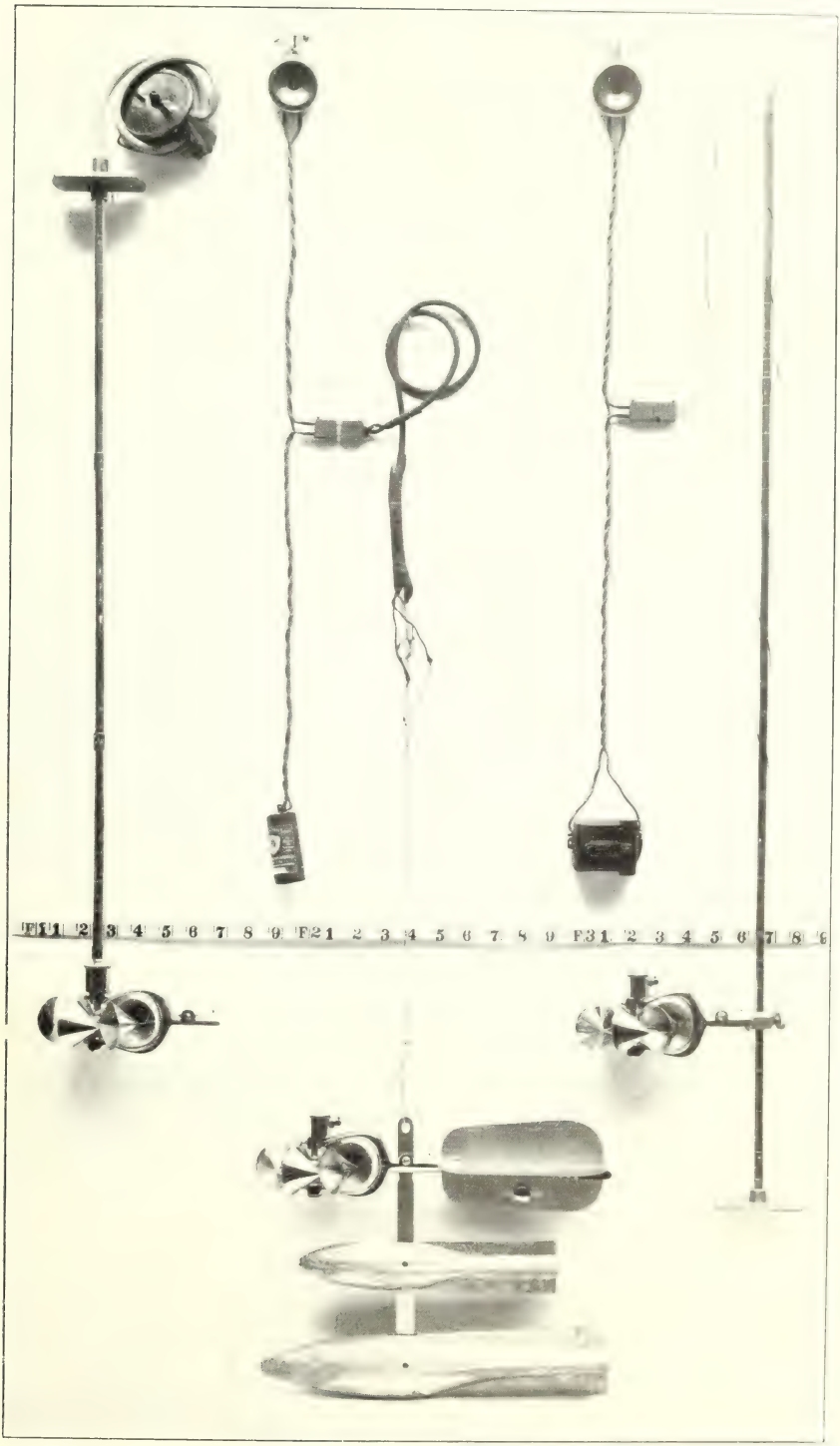
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

heights and daily discharges, for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 10, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations and indicates the method of suspending the current meter; Plate II shows the various types of current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the

[1] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the United States Geol. Survey; Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

degree of permanency of channel and of the relation of discharge to stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With comparatively few exceptions, the observers perform their work honestly. The records are, however, closely watched, and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in the period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made the preceding year and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent;

"fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general, the base data which are collected in the field each year by the Survey engineers are published, not only to comply with the law but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may be seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface-water supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties, who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records clearly worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgment is due to the following persons: Mr. Charles W. Comstock, State engineer of Colorado, who has paid the gage observers at most of the stations in the Arkansas River basin in Colorado and has been of much assistance to the work in other ways.

The Territorial engineer of New Mexico, Mr. Vernon L. Sullivan, who has assisted in maintaining the gaging stations on the Canadian River basin in New Mexico by bearing at least half of the expense of carrying on this work and also by giving special attention to it.

Thanks are also due to the Central Land & Irrigation Co. for bearing the expense of records received in the Big Sandy River basin, and to the United States Forest Service for records furnished on the upper areas of the Arkansas River basin.

The Tallahatchie drainage commission bore the expenses of stations in the Yazoo River basin.

The State geologist of Arkansas, A. H. Purdue, maintained several stations in the White River basin, the results being published by the United States Geological Survey.

DIVISION OF WORK.

Field data in the Arkansas River basin in Colorado were collected under the direction of W. B. Freeman, district engineer, assisted by J. B. Stewart, G. H. Russell, G. J. Lyon, E. O. Christiansen, Thomas Grieve, and other assistants furnished by the State engineer of Colorado.

The field data for the Canadian River basin were collected under the direction of W. B. Freeman, district engineer, assisted by J. B. Stewart, C. D. Miller, and W. W. Mills. Mr. V. L. Sullivan, Territorial engineer, gave special attention to the New Mexico work.

The field data for the Yazoo River basin were collected by engineers of the Tallahatchie drainage commission.

The field data in the White River basin were collected by W. N. Gladson.

The rating curves were made by W. B. Freeman, M. R. Hall, G. C. Stevens, and J. G. Mathers. The computations were made by J. G. Mathers, H. D. Padgett, J. J. Phelan, J. B. Stewart, and A. H. Tuttle. The completed data were prepared for publication by J. G. Mathers. The manuscript was edited by Mrs. B. D. Wood.

GAGING STATIONS MAINTAINED IN THE LOWER MISSISSIPPI RIVER BASIN.

The following list comprises the gaging stations maintained in the lower Mississippi River drainage basin by the United States Geological Survey and cooperative parties. Data for these stations have been published in the reports listed on page 9. The stations are arranged by river basins, in downstream order, tributaries of main streams being indicated by indention:

Meramec River basin.

Meramec River near Meramec, Mo., 1903–1906.
Meramec River near Eureka, Mo., 1903–1906.
Meramec River (Station No. 1) at Fenton, Mo., 1903.
Meramec River (Station No. 2) below Fenton, Mo., 1903.
  Meramec Spring near Meramec, Mo., 1903–1906.
  Courtois Creek at Scotia, Mo., 1905–6.

White River basin.

White River at Beaver, Ark., 1909–10.
White River near Branson, Mo., 1909–10.
White River near Lead Hill, Ark., 1909–10.
White River near Cotter, Ark., 1909–10.
White River at Walls Ferry, Ark., 1909–10.
  Buffalo River near Gilbert, Ark., 1909–10.
  North Fork River near Henderson, Ark., 1909–10.
  Greer Spring at Greer, Mo., 1904.
  Little Red River near Pangburn, Ark., 1909–10.

Arkansas River basin.

Arkansas River, East Fork, near Leadville, Colo., 1890, 1903.
Arkansas River at Granite, Colo., 1895, 1897–1899, 1901, 1910.
Arkansas River at Salida, Colo., 1895–1903, 1909–10.
Arkansas River at Canon City, Colo., 1888–1910.
Arkansas River near Rock Canyon, Colo., 1889.
Arkansas River above Pueblo, Colo., 1885–1887.
Arkansas River at Pueblo, Colo., 1894–1910.
Arkansas River near Nepesta, Colo., 1897–1903, 1910.
Arkansas River near Manzanola, Colo., 1898.
Arkansas River near Rocky Ford, Colo., 1897–1903.

Arkansas River at La Junta, Colo., 1889, 1893–1895, 1903, 1908.
Arkansas River near Las Animas, Colo, 1898.
Arkansas River near Prowers, Colo., 1900, 1901, 1903.
Arkansas River near Amity canal head-gates, Colo., 1898–99.
Arkansas River near Granada, 1898–1901, 1904.
Arkansas River near Barton (Byron), Colo., 1893–94, 1901–2.
Arkansas River at Holly, Colo., 1907–1910.
Arkansas River near Syracuse, Kans., 1903–1906.
Arkansas River near Coolidge, Kans., 1903.
Arkansas River near Dodge, Kans., 1902–1906.
Arkansas River near Hutchinson, Kans., 1895–1905.
Arkansas River near Arkansas City, Kans., 1902–1906.
Arkansas River, Tennessee Fork, near Leadville, Colo., 1890, 1903.
Arkansas River, Lake Fork, near Arkansas Junction, Colo., 1903.
Arkansas River, Lake Fork, near Leadville, Colo., 1890.
Lake Creek near Twin Lakes, Colo., 1899–1900.
Twin Lakes outlet near Twin Lakes, Colo., 1910.
Clear Creek near Granite, Colo., 1890, 1910.
Cottonwood Creek near Buena Vista, Colo., 1910.
Cottonwood Creek, Middle Fork, near Buena Vista, Colo., 1890.
Cottonwood Creek, South Fork, near Buena Vista, Colo., 1890.
Chalk Creek near Buena Vista, Colo., 1910.
Grape Creek near Canon City, Colo., 1907–1909.
Oil or Fourmile Creek near Canon City, Colo., 1910.
Huerfano River near Undercliffe, Colo., 1908.
Cucharas River at Walsenburg, Colo., 1907–8.
Purgatory River at Trinidad, Colo., 1896–1899, 1905–1910.
Purgatory River near Canon Entrance (Alfalfa), Colo., 1905–1907.
Purgatory River near J. J. ranch, Colo., 1898.
Purgatory River near Las Animas, Colo., 1889.
Big Sandy Creek at Hugo, Colo., 1910.
Big Sandy Creek at Kit Carson, Colo., 1910.
Big Spring Creek near Arena, Colo., 1910.
Walnut River near Arkansas City, Kans., 1902–3.
Arkansas River, Salt Fork, near Alva, Okla., 1904–5.
Arkansas River, Salt Fork, near Tonkawa, Okla., 1903–1905.
Medicine River near Kiowa, Kans., 1895–96.
Cimarron River near Arkalon, Kans., 1895–96, 1903–1905.
Cimarron River near Kenton, Okla., 1904–5.
Cimarron River near Garrett, Okla., 1905–1907.
Cimarron River near Waynoka, Okla., 1903–1905.
Verdigris River near Independence, Kans., 1904.
Verdigris River near Liberty, Kans., 1895–1903.
Verdigris River near Catoosa, Okla., 1903–1905.
Fall River near Fall River, Kans., 1904–5.
Neosho River near Neosho Rapids, Kans., 1904.
Neosho River near Iola, Kans., 1895–1903.
Neosho River near Humboldt, Kans., 1904.
Neosho River (or Grand River) near Fort Gibson, Okla., 1899, 1903–1905.
Canadian River near Logan, N. Mex., 1905, 1909–10.
Canadian River at Calvin, Okla., 1904–1908.
Chico Rico Creek near Raton, N. Mex., 1910.
Una del Gato Creek near Raton, N. Mex., 1910.

Arkansas River—Continued.
Canadian River—Continued.
Cimarron River at Ute Park, N. Mex., 1907–1910.
Cimarron River at Springer, N. Mex., 1907–1909.
Rayado River at Abreu's ranch, near Cimarron, N. Mex., 1909–10.
Rayado River near Springer, N. Mex., 1907–1909.
Mora River and La Cueva canal at La Cueva, N. Mex., 1903–1910.
Mora River near Weber, N. Mex., 1903–4.
Mora River near Watrous, N. Mex., 1894–1896.
Sapello River at Sapello, N. Mex., 1903–4.
Sapello Mill tailrace at Sapello, N. Mex., 1903–4.
Sapello River at Los Alamos, N. Mex., 1903–1910.
Manuelitos River near Sapello, N. Mex., 1903–4.
Ute Creek near Logan, N. Mex., 1904–1906, 1909–10.
Beaver Creek at Beaver, Okla., 1904–5.
North Fork of Canadian River near Woodward, Okla., 1903–1906.
North Fork of Canadian River near El Reno, Okla., 1902–1908.
North Fork of Canadian River near Oklahoma, Okla., 1899.
North Fork of Canadian River near Eufaula, Okla., 1899.
Arkansas River canals:
Oxford Farmers canal near Nepesta, Colo., 1903.
Colorado-Kansas canal near Prowers, Colo., 1903.
Keese ditch near Prowers, Colo., 1903.

Yazoo River basin.

Tallahatchie River at Batesville, Miss., 1906–1910.
Tallahatchie River at Philipp, Miss., 1908–1910.
Yazoo River at Greenwood, Miss., 1908–1910.
Yazoo River at Yazoo City, Miss., 1900–1905.
Coldwater River at Savage, Miss., 1908–1910.
Yalobusha River at Grenada, Miss., 1906, 1908–1910.
Sunflower River at Ruleville, Miss., 1908–1910.
Sunflower River at Baird, Miss., 1908–1910.

Homochitto River basin.

Homochitto River at Rosetta, Miss., 1906.

Red River basin.

Red River at Arthur City, Tex., 1905–6.
Red River, Salt Fork, at Mangum, Okla., 1905–6.
Turkey Creek at Olustee, Okla., 1905–1908.
Red River, North Fork, near Granite, Okla., 1903–1908.
Red River, North Fork, near Snyder, Okla., 1905.
Red River, North Fork, near Headrick, Okla., 1905–1908.
Red River, Elm Fork, near Mangum, Okla., 1905–1908.
Elk Creek near Hobart, Okla., 1904–1908.
Otter Creek near Mountain Park, Okla., 1903–1908.
Horse Creek near Mountain Park, Okla., 1905–6.
Otter Creek, Dry Fork, near Mountain Park, Okla., 1905–6.
Wichita River at Wichita Falls, Tex., 1910.
Washita River near Anadarko, Okla., 1902–1908.
Ouachita River near Malvern, Ark., 1903–1905.
Ouachita River near Arkadelphia, Ark., 1905–6.

WHITE RIVER DRAINAGE BASIN.

DESCRIPTION.

White River rises in the Boston Mountains near the western border of Arkansas, nearly 50 miles south of the Arkansas-Missouri line, flows northward into Missouri, then bends southeastward and reenters Arkansas, continuing its general southeasterly course to the southeast corner of Arkansas County, where its channel divides, one part entering Arkansas River and the other Mississippi River. The natural discharge of White River is into the Mississippi. The length of the river from its source to its mouth is about 300 miles by general course, but the stream is very crooked, and, including the bends, it is probably not less than 400 miles long.

The important tributaries from the north are North Fork River, Black River, and Cache River; those from the south are Kings River, Buffalo River, and Red River.

The basin comprises 27,700 square miles, of which 10,000 square miles lie in Missouri and the remainder in northern and eastern Arkansas. Topographically, it consists of two parts—a highland area, 22,200 square miles in extent, lying west of the St. Louis, Iron Mountain & Southern Railway, and an area of lowlands, including 5,500 square miles, lying east of this railroad.

The topography of the highland portion of the basin is rough. The rocks are sandstone, limestone, and shale, lying horizontal. Through these the main stream and all its tributaries have cut ravines that range in depth from a few score feet to more than 1,200 feet. Elevations in the Boston Mountains exceed 2,000 feet above sea level. The elevation of the bed of White River ranges from 1,250 feet at the north base of the mountains to less than 250 feet at Batesville. Throughout the distance between these two points there are no falls and but a few rapids.

The lowland area of the basin is level, and stands only a few feet above the water of the river at average stage. It is cut by numerous sloughs which have been formed by the clogging of the streams and the partial filling of horseshoe lakes. Probably all of it is susceptible to drainage.

The entire area was originally forest covered, but a large proportion of the river bottoms and the level parts of the uplands is now under cultivation. The steep rock-covered slopes, which constitute a considerable part of the area, are still forest covered.

The records kept at the agricultural experiment station at Fayetteville from 1871 to 1907, inclusive, show that the annual rainfall at that place ranges from a minimum of 34.58 inches in 1871 to a maxi-

mum of 67.48 inches in 1905. The average for the 37 years was 45.609 inches. The rainfall at Fayetteville is probably fairly representative for that part of the basin that lies within the highland division.

The average snowfall is about 9 inches. Snow lies on the ground but a few days at most, and there is seldom ice enough on the ground to interfere with travel.

Irrigation has not been attempted in this basin, but it is practicable in a small way along the stream bottoms, where the water may be taken from the streams, and on a still smaller scale on the benches of the hill slopes, where water from springs may be stored.

As the valleys are narrow and the banks in most places high, there are many points along the streams where water could be stored without flooding much land. Such storage sites may be found along White River and all its highland tributaries. Numerous large springs of fine water occur throughout the highland area.

Buffalo River and that portion of White River above the mouth of Buffalo River can be utilized for logging or boating only during the rainy season. A series of Government dams above Batesville will, when completed, render White River navigable throughout the year as far up as the mouth of Buffalo River. In the lowland part of its course White River is navigable for small boats at all seasons.

A survey to determine the available water power along White River and its tributaries is now being conducted. The smaller of the numerous power sites can probably be made to furnish a few hundred horsepower and the larger ones several thousand horsepower.

WHITE RIVER AT BEAVER, ARK.

This station, which is located at the Missouri & North Arkansas Railroad bridge at Beaver, Ark., was established July 17, 1909, to obtain data for use in studying water power, water supply, flood control, storage, and navigation problems.

No important tributaries enter near the station.

The datum of the chain gage, which is fastened to the upstream guardrail of the bridge, has not been changed. Measurements at high water are made from this bridge; low-water measurements are made by wading.

The station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey since its establishment.

The following discharge measurement was made by W. N. Gladson:

May 24: Width, 182 feet, area of section, 1,330 square feet; gage height, 8.44 feet; discharge, 3,620 second-feet.

Daily gage height, in feet, of White River at Beaver, Ark., for 1910.

[Reno N. Lowe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.8	4.0	8.05	6.2	4.65	6.1	5.4	4.05	3.7	3.8	3.6	3.5
2	3.7	4.05	6.8	5.45	4.55	5.95	5.1	4.0	3.8	3.7	3.6	3.5
3	3.8	3.9	6.3	5.25	4.45	5.55	4.9	4.0	3.8	3.75	3.6	3.5
4	3.8	3.9	5.95	4.95	4.35	5.35	5.7	3.95	3.85	3.8	3.6	3.6
5	3.8	4.0	5 55	5.15	4.3	5.15	5.35	3.9	3.8	4.15	3.6	3.55
6	3.8	3.8	5.35	5.9	4.25	4 95	5.1	3.9	4.15	4.4	3.6	3.5
7	4.35	3.8	5.18	6.65	4.25	4.9	4.75	4.8	4.3	4.25	3.6	3.5
8	4.5	3.9	4.95	6.25	4.25	5.2	4.75	6.5	4.05	4.15	3.6	3.5
9	4.4	3.8	4.9	5.9	4.25	5.15	4.9	6.4	4.15	4.0	3.6	3.5
10	4.1	3.8	4.95	6.6	4.3	5.65	5.0	5.5	4.15	3.9	3.6	3.5
11	4.05	3.9	4.8	6.35	4.3	5.6	5.55	5.55	4.0	3.8	3.6	3.5
12	4.0	3.7	4.7	6.6	4.2	6.15	11.65	5.15	4.0	3.8	3.5	3.5
13	4.3	3.8	4.65	9.25	4.15	5.9	12.7	5.2	3.9	4.05	3.5	3.5
14	4 45	3.7	4.6	7.45	4.05	5.5	9.8	4.85	3.8	4.4	3.5	3.5
15	4.35	3.7	4.55	7.45	4.05	5.25	7.55	4.7	3.75	4.5	3.5	3.5
16	4.35	3.8	4.45	7.6	6.5	5.05	6.65	4.55	3.7	4.15	3.5	3.5
17	4.35	3.8	4.38	7.7	18.85	4.85	6.1	4.65	3.65	4.05	3.5	3.5
18	4.35	3.9	4.3	7.3	12.25	4.65	5.7	4.5	3.6	3.95	3.5	3.5
19	4.45	3.95	4.3	6.7	8.95	4.55	5.45	4.45	3.6	3.9	3.5	3.5
20	4.35	3.85	4.22	6.4	7.75	4.55	5.25	4.25	3.6	3.9	3.5	3.5
21	4.35	4.25	4.2	6.05	7.05	4.7	5.05	4.2	3.6	3.9	3.5	3.5
22	4.35	4.5	4.15	5.85	6.8	4.6	4.85	4.2	3.6	3.8	3.5	3.4
23	4.35	4.7	4.1	5.55	7.65	4.5	4.75	4.2	3.55	3.8	3.5	3.4
24	4.35	4.9	4.1	5.35	8.25	4.65	4.65	4.15	3.5	3.8	3.5	3.4
25	4.2	5.08	4.0	5.3	8.2	4.55	4.5	4.05	3.5	3.8	3.5	3.4
26	4.3	5.25	4.0	5.1	7.8	5.05	4.4	4.0	3.5	3.75	3.5	3.4
27	4.15	6.3	4.0	4.95	7.0	5.05	4.35	3.9	3.5	3.7	3.6	3.4
28	4.2	7.8	4.0	4.85	6.5	6.0	4.25	3.85	4.3	3.7	3.6	3.5
29	4.0	.....	3.95	4.8	6.05	6.75	4.15	3.8	4.2	3.7	3.6	3.5
30	4.1	.....	4.15	4.65	5.75	5.75	4.2	3.8	3.95	3.7	3.5	3.5
31	4.0	.....	5.3	.....	5.55	.....	4.15	3.75	.....	3.7	.....	3.5

WHITE RIVER NEAR BRANSON, MO.

This station, which is located at the St. Louis, Iron Mountain & Southern Railway bridge near Branson, Mo., was established July 19, 1909, to obtain data for use in studying water power, water supply, flood control, storage, and navigation problems.

Turkey Creek enters the river on the right bank about 600 feet below the section.

The datum of the gage, which is fastened to the downstream guard rail of the bridge, has remained unchanged. At high water, measurements are made from this bridge; at low water they are made by wading.

This station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey since its establishment.

Daily gage height, in feet, of White River near Branson, Mo., for 1910.

[J. A. Medley, observer.]

Day.	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
1	2.95	3.0	7.35	2.6	2.95	4.05	4.2	3.3	2.25	2.55	2.4	2.2
2	2.95	3.0	7.15	4.2	3.0	4.0	4.0	3.2	2.5	2.5	2.45	2.2
3	2.95	3.0	6.6	3.9	2.95	4.1	4.0	3.0	3.15	2.6	2.4	2.2
4	2.9	2.9	5.7	3.85	2.55	4.35	4.25	3.0	3.05	2.7	2.4	2.2
5	3.0	2.8	5.55	3.8	2.35	5.9	4.45	3.0	2.9	3.1	2.35	2.2
6	3.0	2.9	4.55	4.15	2.5	6.05	4.15	2.85	3.6	4.45	2.3	2.1
7	3.0	2.9	4.05	4.05	2.7	5.45	4.45	2.85	3.6	4.9	2.2	2.2
8	3.0	2.85	3.8	4.6	3.0	7.2	4.35	3.45	3.5	5.05	2.2	2.3
9	3.2	2.85	3.3	4.45	3.9	8.9	3.85	5.1	3.3	4.6	2.15	2.3
10	3.2	2.7	3.35	4.85	3.85	10.25	3.55	6.5	3.2	3.7	2.2	2.3
11	3.15	2.8	4.1	4.8	3.3	9.45	4.4	5.6	3.2	3.4	2.2	2.3
12	3.1	2.8	3.6	4.0	2.9	7.9	9.1	4.55	2.95	3.3	2.3	2.3
13	3.12	2.75	3.4	4.05	2.65	6.35	11.8	4.15	2.6	3.6	2.3	2.3
14	3.25	2.7	3.3	6.35	2.95	6.0	9.95	3.9	2.7	3.9	2.3	2.2
15	3.4	2.6	3.35	5.45	2.9	5.3	8.0	3.85	2.55	3.5	2.4	2.2
16	3.5	2.7	3.15	5.1	3.05	4.7	5.95	3.8	2.5	3.3	2.4	2.2
17	4.0	2.7	2.9	5.5	11.55	4.15	5.3	3.7	2.4	3.1	2.4	2.1
18	3.8	2.7	2.85	5.0	15.2	4.15	5.0	3.05	2.5	3.0	2.4	2.1
19	3.65	2.7	2.9	5.2	9.9	3.6	4.25	3.35	2.5	3.0	2.3	2.1
20	3.6	3.05	2.8	4.7	7.55	3.35	4.0	3.6	2.45	3.0	2.3	2.1
21	3.6	3.9	2.8	4.35	6.4	3.5	3.85	3.45	2.4	3.15	2.3	2.2
22	3.5	5.05	2.5	3.85	6.0	3.4	3.75	3.3	2.5	2.95	2.3	2.2
23	3.4	5.8	2.3	3.55	5.4	3.45	3.7	3.15	2.5	2.65	2.2	2.1
24	3.35	5.9	2.3	3.2	5.35	3.35	3.7	3.0	2.5	2.85	2.2	2.0
25	3.35	4.8	2.35	3.35	6.25	3.1	3.95	2.9	2.45	2.8	2.25	2.0
26	3.2	3.75	2.35	3.05	6.7	3.4	3.5	2.9	2.4	2.8	2.3	2.0
27	3.2	5.25	2.4	3.1	6.55	3.5	3.3	2.85	2.65	2.85	2.3	2.0
28	3.2	6.25	2.3	2.95	5.7	3.8	3.0	2.7	3.0	2.7	2.3	2.05
29	3.2	.....	2.3	3.0	5.0	4.75	2.9	2.6	2.85	2.55	2.3	2.15
30	3.15	.....	2.4	2.95	4.65	5.05	2.95	2.6	2.6	2.5	2.3	2.3
31	2.9	.....	2.3	.....	4.3	.....	3.35	2.35	.....	2.5	.....	2.3

WHITE RIVER NEAR LEAD HILL, ARK.

This station, which is located at Bradley's ferry, 5 miles northeast of Lead Hill, Ark., was established October 1, 1909, to obtain data for use in studying water power, navigation, flood control, and storage problems.

Fishtrap Shoals are about 400 feet below the station.

The gage consists of two vertical sections on the right bank of the river about 100 feet below the ferry. Its datum has not been changed. Measurements are made from the ferryboat.

The station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey since its establishment.

The following measurement was made by W. N. Gladson:

May 17: Width, 370 feet; area of section, 2,140 square feet; gage height, 5.85 feet; discharge, 8,700 second-feet.

Daily gage height, in feet, of White River near Lead Hill, Ark., for 1910.

[Jerry Upshaw, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.9	2.0	6.4	2.25	2.6	3.7	3.9	2.7	1.7	1.9	1.7	1.4
2	1.9	2.0	6.8	2.6	2.5	3.6	3.6	2.5	2.0	2.0	1.7	1.4
3	1.8	1.9	6.1	3.2	2.4	3.4	3.15	2.3	2.3	2.0	1.7	1.3
4	1.7	1.9	5.35	3.0	2.3	3.2	3.2	2.2	2.7	2.4	1.6	1.3
5	1.8	1.9	4.8	3.0	2.2	3.85	3.55	2.1	2.5	2.6	1.6	1.3
6	1.4	1.9	4.45	3.6	2.2	4.85	3.45	2.0	2.95	5.5	1.6	1.3
7	1.8	1.8	4.05	4.0	2.3	4.8	3.35	2.0	3.3	4.2	1.6	1.3
8	1.8	1.8	3.8	4.1	2.3	4.95	3.2	2.0	3.0	4.3	1.6	1.3
9	1.9	1.8	3.6	4.45	3.2	7.7	3.1	5.65	2.8	3.7	1.5	1.3
10	1.9	1.7	3.7	4.2	3.45	9.7	3.1	6.75	2.7	3.3	1.5	1.3
11	2.2	1.7	4.4	4.0	3.3	9.8	3.05	5.75	2.6	3.05	1.5	1.3
12	2.0	1.7	4.25	4.05	3.1	7.45	8.8	4.75	2.45	2.8	1.5	1.3
13	2.0	1.7	4.0	4.0	3.0	5.85	10.3	3.95	2.25	2.8	1.5	1.3
14	2.0	1.7	3.9	4.55	2.8	5.55	10.75	3.65	2.2	3.05	1.5	1.3
15	2.55	1.6	3.75	5.05	2.6	4.7	8.5	3.6	2.1	3.15	1.5	1.3
16	2.95	1.6	3.55	4.6	2.85	4.2	6.35	3.3	2.0	2.75	1.5	1.3
17	3.1	1.6	3.4	4.75	5.2	4.0	5.75	3.1	1.9	2.65	1.4	1.3
18	3.1	1.6	3.15	4.8	13.2	3.7	5.7	3.55	1.8	2.5	1.4	1.3
19	2.9	1.6	3.0	4.7	12.5	3.45	4.75	3.3	1.8	2.3	1.4	1.3
20	2.8	1.7	2.9	4.6	7.75	3.2	4.1	3.05	1.7	2.2	1.4	1.3
21	2.7	2.0	2.8	4.25	6.65	3.1	3.65	2.8	1.7	2.2	1.4	1.3
22	2.6	2.45	2.7	3.95	5.3	3.0	3.3	2.95	1.6	2.4	1.4	1.3
23	2.6	3.0	2.6	3.7	4.8	3.0	3.2	2.55	1.6	2.3	1.4	1.3
24	2.5	3.2	2.5	3.5	4.5	2.9	3.3	2.45	1.5	2.2	1.4	1.3
25	2.5	3.15	2.4	3.3	4.6	2.7	3.2	2.4	1.5	2.1	1.4	1.3
26	2.4	3.35	2.4	3.15	5.0	2.7	3.2	2.25	1.5	2.0	1.4	1.3
27	2.3	5.05	2.3	3.0	5.1	2.7	3.0	2.1	1.9	1.9	1.4	1.3
28	2.2	6.1	2.2	2.9	4.5	2.75	2.75	2.0	1.85	1.8	1.4	1.3
29	2.2	.....	2.2	2.8	4.2	3.1	2.6	2.0	2.2	1.8	1.4	1.3
30	2.1	.....	2.2	2.7	4.0	4.0	2.5	1.9	2.0	1.8	1.4	1.3
31	2.0	.....	2.15	.....	3.75	.....	2.65	1.8	.....	1.8	.....	1.3

WHITE RIVER NEAR COTTER, ARK.

This station, which is located at the St. Louis, Iron Mountain & Southern Railway bridge near Cotter, Ark., was established July 21, 1909, to obtain data for use in studying water power, water supply, flood control, storage, and navigation problems.

The station is about three-fourths of a mile below the mouth of Falling Ash Creek.

The datum of the gage, which is fastened to the upstream guardrail of the bridge, has remained unchanged. Measurements are made from the bridge, from a ferry about 500 feet above, or by wading.

This station is maintained under the direction of the State geologist of Arkansas, and has not been visited by engineers of the United States Geological Survey since its establishment.

Daily gage height, in feet, of White River near Cotter, Ark., for 1910.

[S. Butterfield, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.15	2.4	7.55	2.5	3.25	4.85	5.15	3.5	2.65	.....	2.5	2.0
2	2.3	2.3	7.5	2.55	3.15	4.55	5.05	3.6	2.45	2.65	2.5	2.0
3	2.35	2.3	7.6	3.05	3.05	4.4	4.5	3.45	2.8	2.65	2.5	2.0
4	2.35	2.3	6.85	3.9	2.9	4.4	4.25	3.2	3.4	5.1	2.4	1.9
5	2.35	2.3	6.2	3.75	2.85	4.6	4.25	3.0	3.7	3.95	2.4	1.9
6	2.35	2.2	5.7	3.75	2.85	4.95	4.65	2.9	4.05	6.05	2.3	1.9
7	2.3	2.2	5.25	4.5	2.85	5.65	4.6	2.9	4.5	6.65	2.3	1.9
8	2.25	2.2	4.95	4.85	2.75	6.1	4.35	2.9	4.4	5.7	2.2	1.9
9	2.25	2.1	4.7	5.3	3.15	9.2	4.1	3.05	4.15	5.6	2.2	1.9
10	2.35	2.1	4.5	5.25	3.9	10.95	6.25	6.55	4.0	5.05	2.2	1.9
11	2.45	2.1	5.05	5.05	4.15	10.8	5.0	7.35	3.75	4.5	2.2	1.9
12	2.75	2.1	5.5	4.9	3.9	10.1	5.3	6.5	3.55	4.1	2.2	1.9
13	2.75	2.0	5.2	4.9	3.7	8.05	13.15	5.55	3.35	4.0	2.2	1.9
14	2.6	2.0	5.0	4.9	3.5	7.15	12.35	5.05	3.2	3.85	2.2	1.9
15	2.55	2.0	4.7	5.95	3.3	6.55	10.95	4.75	3.05	4.3	2.2	1.9
16	2.95	2.0	4.5	6.6	3.4	6.0	8.65	4.45	2.85	4.3	2.1	1.9
17	3.65	1.9	4.3	5.95	4.45	5.5	7.05	4.4	2.8	3.9	2.1	1.9
18	3.85	1.9	4.1	5.9	9.05	5.1	6.75	4.35	2.65	3.65	2.1	1.9
19	3.8	1.8	3.9	5.75	14.3	4.75	6.05	4.35	2.6	3.55	2.1	1.9
20	3.65	2.0	3.75	5.65	11.15	4.55	5.8	4.15	2.55	3.35	2.0	1.9
21	3.5	2.05	3.7	5.45	8.1	4.35	5.3	4.0	2.4	3.2	2.0	1.9
22	3.3	2.4	3.45	4.95	7.05	4.15	4.75	3.9	2.35	3.1	2.0	1.8
23	3.2	3.1	3.3	4.55	6.4	4.0	4.6	3.85	2.3	3.35	2.0	1.8
24	3.1	3.85	3.2	4.45	6.0	3.85	4.6	3.65	2.2	3.4	2.0	1.8
25	3.0	3.95	3.05	4.3	5.75	3.65	4.6	3.45	2.2	3.15	2.0	1.8
26	2.9	4.1	2.95	4.1	6.35	3.6	4.45	3.25	2.2	3.0	2.0	1.8
27	2.9	5.95	2.9	3.9	6.3	3.6	4.35	3.05	2.6	2.95	2.0	1.8
28	2.8	7.4	2.8	3.7	6.1	3.6	4.0	3.0	2.75	2.75	2.0	1.8
29	2.7	.....	2.7	3.5	5.55	3.75	3.75	2.85	2.6	2.55	2.0	1.8
30	2.6	.....	2.55	3.3	5.3	4.3	3.55	2.75	3.1	2.5	2.0	1.8
31	2.6	.....	2.5	.....	5.3	.....	3.5	2.7	.....	2.5	.....	1.8

WHITE RIVER AT WALLS FERRY, ARK.

This station, which is located at the Government dam at Walls Ferry, Ark., will furnish data necessary in studying water power, navigation, and flood control problems. The discharge of the stream will be computed from the records of the gage heights of the upper gage at the lock, considering the dam as a weir. Discharge measurements will be made in order to determine the proper coefficients to be used. The first measurement was made in November, 1909.

This station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey.

BUFFALO RIVER NEAR GILBERT, ARK.

This station, which is located at the Missouri & North Arkansas Railroad bridge near Gilbert, Ark., was established July 16, 1909, to obtain data for use in studying water power and storage problems.

Bear Creek is tributary to Buffalo River from the right bank about one-fourth mile above the station.

The datum of the chain gage, which is fastened to the upstream guardrail of the bridge, from which high-water measurements are

also made, has not been changed. Low-water measurements are made by wading. Measurements of high water may be complicated by the flow from Bear Creek.

This station is maintained under the direction of the State geologist of Arkansas, and has not been visited by engineers of the United States Geological Survey since its establishment.

Discharge measurements of Buffalo River near Gilbert, Ark., in 1910.

Date.	Hydrographer.	Width	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 23	W. N. Gladson	160	931	7.1	2,660
Aug. 1	.....do	68	131	2.97	137

NOTE.—Measurements not made at regular section.

Daily gage height, in feet, of Buffalo River near Gilbert, Ark., for 1910.

[Esther Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	3.2	6.9	3.2	3.5	4.6	4.0	2.9	3.2	3.0	3.1	2.9
2	2.9	3.0	6.3	3.1	3.4	4.5	4.3	2.8	3.3	2.9	3.1	2.8
3	2.9	3.1	5.7	3.1	3.4	4.4	7.2	2.8	3.3	2.9	3.1	2.8
4	2.9	3.1	5.2	6.5	3.4	4.1	6.6	2.8	3.2	6.5	3.1	2.8
5	2.9	2.9	4.8	9.3	3.3	4.3	7.2	2.8	3.2	11.0	3.1	2.9
6	3.2	3.0	4.6	8.1	3.2	4.3	6.2	2.9	7.2	9.6	3.1	2.9
7	3.8	3.0	4.4	6.6	3.2	4.1	5.4	4.2	7.0	7.7	3.1	2.9
8	3.7	2.9	4.1	5.8	3.2	4.0	4.9	7.0	5.2	6.2	3.0	2.8
9	3.6	2.8	4.0	5.3	3.3	5.4	4.4	6.1	4.6	5.4	3.0	2.8
10	3.5	2.8	4.1	5.2	3.2	8.3	4.3	9.3	4.2	4.8	3.0	2.8
11	3.5	2.8	4.9	5.0	3.2	8.2	4.0	6.7	3.9	4.5	3.0	2.8
12	3.4	2.7	4.7	4.9	3.2	7.4	7.1	5.7	3.7	4.2	3.0	2.8
13	3.4	2.8	4.6	5.1	3.1	6.2	8.9	5.1	3.6	5.4	3.0	2.8
14	3.4	2.8	4.4	5.2	3.1	5.6	6.5	5.3	3.5	5.5	3.0	2.8
15	3.4	2.7	4.2	9.9	3.0	5.0	5.9	15.3	3.4	5.0	3.0	2.8
16	3.3	2.8	4.0	7.9	11.25	4.6	5.2	7.1	3.3	4.6	2.9	2.8
17	3.4	3.6	4.0	7.5	18.3	4.3	4.7	5.8	3.2	4.4	2.9	2.8
18	3.5	3.1	3.8	6.6	11.4	4.1	4.4	6.9	3.1	4.3	2.9	2.8
19	4.0	2.9	3.8	5.9	8.3	4.0	4.0	10.3	3.1	4.0	2.9	2.8
20	4.0	2.9	3.6	5.6	7.2	3.9	3.9	7.3	3.0	3.9	2.9	2.8
21	4.2	2.9	3.5	5.0	6.6	3.8	3.7	6.3	3.0	3.8	2.9	2.8
22	4.0	3.0	3.5	4.9	6.0	3.6	3.5	5.5	2.9	3.7	2.9	2.8
23	3.9	3.3	3.5	4.7	3.9	3.5	3.5	4.9	3.1	3.6	2.9	2.8
24	3.8	3.9	3.3	4.4	10.3	3.5	4.0	4.5	3.1	3.5	2.9	2.8
25	3.6	4.1	3.3	4.2	8.1	4.0	4.0	4.2	3.0	3.4	2.9	2.8
26	3.6	4.0	3.4	4.2	7.6	3.9	3.7	4.0	2.9	3.4	2.9	2.8
27	3.5	7.9	3.3	4.0	6.9	4.4	3.5	3.8	3.1	3.4	2.9	2.8
28	3.4	8.4	3.2	3.9	6.1	4.3	3.3	3.6	3.1	3.3	2.9	2.8
29	3.3	.....	3.1	3.8	5.6	.....	3.1	3.5	3.1	3.2	2.9	2.9
30	3.2	.....	3.1	3.6	5.2	.....	3.1	3.4	3.0	3.2	2.9	2.9
31	3.2	.....	3.2	.....	4.9	.....	3.0	3.2	.....	3.2	.....	3.6

NORTH FORK RIVER NEAR HENDERSON, ARK.

This station, which is located at Smith's ferry, near Henderson, Ark., was established July 23, 1909, to obtain data for use in studying water power, storage, and navigation problems.

Bayou Creek enters on the left bank about 1¼ miles above the station.

The gage consists of three vertical sections on the left bank near the ferry. Its datum has not been changed. Measurements are made from the ferryboat or by wading at low water.

This station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey since its establishment.

The following measurement was made by W. N. Gladson:

May 19: Width, 275 feet; area of section, 868 square feet; gage height, 1.95 feet; discharge, 1,110 second-feet.

Daily gage height, in feet, of North Fork River near Henderson, Ark., for 1910.

[F. S. Field, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.6	1.7	3.45	1.7	1.9	.....	2.0	2.5	1.25	1.7	1.7	1.7
2	1.6	1.7	2.9	1.65	1.8	.....	1.85	2.25	1.15	1.7	1.7	1.7
3	1.7	1.7	2.75	1.6	1.8	.....	2.0	2.0	2.25	1.7	1.7	1.7
4	1.7	1.6	2.7	1.65	1.7	.....	2.3	1.9	2.9	4.75	1.7	1.7
5	1.7	1.6	2.65	1.8	1.6	.....	2.75	1 9	2.75	3.3	1 7	1 7
6	1 8	1.55	2.55	1.95	1.85	2.5	2.9	1.9	3.2	6.1	1.7	1.7
7	1.8	1.5	2.6	2.5	1.9	2.1	2.7	1.9	2.9	5.65	1.7	1.7
8	1.8	1.5	2.7	2.55	1.85	2.2	2.55	1.9	2.45	3.5	1.7	1.7
9	1.8	1.5	2.8	2.35	1.8	5.55	2.35	1.95	2.25	3.2	1.7	1.7
10	1.7	1.6	3.2	2.3	1.85	4.5	4.6	2.4	1.95	2.6	1.7	1.7
11	1.7	1.6	3.45	2.2	1.9	3.65	3.4	2.55	1.9	2.2	1.7	1.7
12	1.7	1.55	2.95	2.3	2.0	3 45	4.7	2.15	1.8	2.0	1.7	1.7
13	1.7	1.5	2.8	2.6	1.9	3.0	5.4	2.0	1.7	2.0	1.7	1.7
14	1.65	1.5	2.75	3.1	1.8	3.0	4.0	2.0	1.65	2.15	1.7	1.7
15	1.65	1.55	2.6	3.45	1.95	2.45	3.95	1.95	1.45	2.0	1.7	1.7
16	1.7	1.6	2.5	3.65	2.4	2.25	3.25	1.9	1.25	2.0	1.7	1.6
17	1.75	1.6	2.4	3.55	2.35	2.1	4.3	1.9	1.05	2.0	1.7	1.6
18	1.8	1.6	2.3	3.15	2.15	2.1	3.55	2.7	1.7	2.0	1.7	1.6
19	1.7	1.6	2.2	2.9	1.95	2.15	2.9	2.4	1.7	1.9	1.7	1.5
20	1.7	1.6	2.15	2.45	1.9	2.1	2.7	2.2	1.7	1.9	1.7	1.5
21	1.6	1.5	2.1	2.35	1.9	2.1	2.45	2.0	1.7	1.9	1.7	1.5
22	1.65	1.5	2.0	2.3	1.9	2.05	2.2	1.9	1.65	1.9	1.7	1.5
23	1.7	1.6	2.0	2.2	1.9	2.05	3 85	1.85	1.6	1.8	1.7	1.5
24	1.7	1.65	1.95	2.2	1.8	2.0	2.3	1.8	1.65	1.8	1.7	1.5
25	1.7	1.7	1.9	2.1	1.8	2.0	2.2	1.8	1.7	1.7	1.7	1.5
26	1.6	1.7	1.9	2.1	1.8	2.0	2.05	1.85	1.7	1.7	1.7	1.5
27	1.6	4.35	1.8	2.1	1.9	2.0	2.0	1.85	1.75	1.7	1.7	1.5
28	1.6	4.0	1.7	2.0	1.9	2.0	2.0	1.8	1.95	1.7	1.7	1.5
29	1.6	.....	1.7	1.95	.....	2.0	1.95	1.8	2.0	1.7	1.7	1.6
30	1.7	.....	1.8	1.9	.....	2.0	2.4	1.75	1.8	1.7	1.7	1.7
31	1.7	.....	1.8	.....	.....	.....	2.7	1.55	.....	1.7	.....	1.7

LITTLE RED RIVER NEAR PANGBURN, ARK.

This station, which is located at Skillern's ferry, near Pangburn, Ark., was established July 15, 1909, to obtain data for use in studying water power, water supply, storage, and navigation problems.

Big Red Creek joins Little Red River about half a mile below the station.

This stream is used to considerable extent for running logs. Log jams above and below the station affect the gage for short periods. Ice rarely, if ever, forms on this stream.

The gage consists of three vertical sections on the right bank near the ferry. Its datum has not been changed. Measurements are made from a ferryboat or by wading at low water.

This station is maintained under the direction of the State geologist of Arkansas and has not been visited by engineers of the United States Geological Survey since its establishment.

The following measurement was made by W. N. Gladson:

May 21: Width, 222 feet; area of section, 1,980 square feet; gage height, 8.1 feet; discharge, 3,380 second-feet.

Daily gage height, in feet, of Little Red River near Pangburn, Ark., for 1910.

[A. J. Stolz, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.1	3.7	16.4	3.5	3.7	6.2	3.9	3.1	2.8	2.5	2.7	2.3
2	3.1	3.6	11.4	3.3	3.5	5.3	4.1	3.0	2.8	2.6	2.7	2.3
3	3.0	3.4	9.2	3.5	3.4	4.5	9.6	2.9	2.8	2.5	2.6	2.3
4	3.0	3.3	7.9	4.1	3.3	4.8	10.5	2.7	2.9	2.5	2.6	2.3
5	3.1	3.2	7.1	6.7	3.2	4.7	12.4	2.6	2.9	2.4	2.6	2.3
6	3.4	3.0	6.5	24.3	3.1	4.5	9.3	2.6	2.8	32.1	2.5	2.4
7	6.4	3.0	6.1	16.0	3.1	4.3	7.5	2.5	2.7	38.5	2.5	2.4
8	6.3	3.1	5.6	12.6	2.9	4.6	6.4	2.6	2.6	25.9	2.4	2.4
9	5.7	3.0	5.3	9.4	2.9	5.4	5.5	2.8	3.7	8.9	2.4	2.3
10	5.4	3.0	5.1	7.5	2.8	12.0	4.7	4.1	3.3	7.3	2.4	2.3
11	5.1	2.9	6.6	7.1	2.8	18.5	4.4	6.6	2.8	6.3	2.5	2.3
12	4.9	2.9	8.6	6.7	2.7	16.4	9.1	5.3	2.8	5.8	2.4	2.3
13	4.8	2.8	7.3	6.5	2.7	11.9	7.4	4.4	2.7	5.4	2.4	2.3
14	5.1	2.8	6.5	6.3	2.6	8.7	7.3	4.5	2.6	5.2	2.3	2.3
15	5.5	2.7	6.0	6.0	2.6	6.8	7.1	4.8	2.5	5.5	2.3	2.3
16	5.4	2.7	5.6	14.0	2.9	5.9	6.7	5.6	2.4	5.3	2.3	2.3
17	5.2	2.8	5.2	14.2	4.6	5.4	6.0	6.0	2.4	4.9	2.4	2.3
18	5.1	2.8	4.8	11.8	20.1	4.8	5.5	5.2	2.3	4.5	2.4	2.3
19	5.4	2.9	4.5	9.4	13.6	4.3	5.0	4.8	2.3	4.1	2.4	2.3
20	7.5	2.8	4.3	8.0	9.8	4.0	4.4	4.6	2.2	3.8	2.3	2.2
21	7.1	2.8	4.3	7.0	8.4	3.8	4.0	6.0	2.2	3.6	2.3	2.2
22	6.3	2.8	4.2	6.4	7.8	3.6	3.6	5.2	2.1	3.5	2.3	2.5
23	5.8	3.0	4.4	5.9	14.7	3.5	3.4	4.7	2.1	3.4	2.3	2.5
24	5.4	3.9	4.7	5.4	22.45	3.5	3.3	4.4	2.1	3.3	2.3	2.4
25	5.1	4.8	4.5	4.9	25.4	3.8	8.1	3.8	2.1	3.2	2.3	2.4
26	4.8	5.2	4.3	4.5	14.1	3.6	6.4	3.4	2.0	3.1	2.3	2.4
27	4.6	10.8	4.1	4.4	9.7	3.5	5.0	3.4	2.0	3.0	2.3	2.4
28	4.5	24.4	4.0	4.2	7.9	3.8	4.5	3.6	2.2	2.9	2.4	2.5
29	4.2	.....	3.8	4.0	6.6	4.9	4.0	3.3	2.3	2.9	2.4	3.5
30	4.0	.....	3.7	3.9	6.0	4.5	3.6	3.1	2.4	2.8	2.4	6.7
31	3.8	.....	3.9	.....	5.6	.....	3.3	3.0	.....	2.8	.....	7.8

ARKANSAS RIVER DRAINAGE BASIN.

DESCRIPTION.

The western rim of the Arkansas basin is formed by three of the highest mountain ranges of Colorado—the Saguache, Sangre de Cristo, and Culebra, each having summits more than 14,000 feet in altitude. The melting of the almost perpetual snow that mantles the high peaks near the north end of this rim furnishes water for three small creeks, the East, Lake, and Tennessee forks, which unite near Leadville to form the Arkansas.

From the junction of the forks the river flows a little east of south for about 75 miles, then turns to the east and cuts through a canyon whose perpendicular walls attain elevations of more than 2,000 feet above the water's edge, emerging finally into the plains region near Canon City. From Canon City to the Colorado-Kansas State line its

general course is eastward for about 200 miles. Entering Kansas the river runs for 140 miles by general course a little south of east; it then makes a bold curve to the north, forming what is known as the Great Bend, below which it flows southeastward across Oklahoma to its junction with the Mississippi in northeastern Arkansas. The entire length of the stream from source to mouth is about 1,500 miles and its drainage basin includes 177,500 square miles.

In its upper course the Arkansas is fed by numerous small streams, generally short, which lie wholly in or have their sources in the mountains. Those that head in the mountains and flow out onto the prairies are used more or less for irrigation. The most important of these tributaries are Greenhorn, Huerfano, Apishapa, and Purgatory rivers. The plains tributaries include Black Squirrel, Horse, Two Butte and Big Sandy creeks, Salt Fork, Cimarron, Verdigris, Grand, and Canadian rivers, and scores of smaller streams. The largest of these tributaries is Canadian River.

Above Pueblo, Colo., the drainage basin is as a whole mountainous, but toward the south the elevation decreases and the country is well marked by stream channels that trend in a general northeasterly direction. The streams on the north flow generally southward when they emerge from the mountains.

At the base of the mountains are the foothills, irregular and seared by canyons, and marked by disconnected mesas and buttes of different but moderate altitudes; beyond are great level plains, extending far to the east and constituting a portion of what was formerly known as the Great American Desert. East of the foothills and north of the river the topography is that typical of the Great Plains region, but to the south the surface of the plains is generally more accented. That part of the drainage basin that extends from the mountains to the Colorado-Kansas line embraces an area of about 25,000 square miles. Beyond this is the flat semiarid section of western Kansas, and then the more humid country in eastern Kansas, Oklahoma, and Arkansas.

The rocks exposed in the mountainous area present great variety, ranging from the metamorphic granites of Pikes Peak and the Royal Gorge of the Arkansas to the glacial drift in the upper valley of the Arkansas from Salida to Leadville and in the upper Grape Creek Range. Next to the granites the eruptive rocks are most common, and sedimentary rocks are found over wide areas.

In the plains region the principal rock exposures seen along the heavily eroded stream channels are shales, sandstone, and limestone in alternating layers. The soil cover, which is necessarily rather meager in the mountainous section, varies in the plains region from the upland sands and gravels of the mesas to the sandy loams and adobe clays of the river valleys. The adobe soils are very friable and

dry and melt away rapidly under the action of water. Many of the dry intermittent channels, usually termed arroyos, are narrow and have high vertical walls, and are cut deeper by each succeeding flood. The vegetation is scanty, consisting of native grasses, sagebrush, chico, and cactus pads. The ranges have been very closely pastured, making conditions conducive to an excessive flood run-off.

Above Canon City the fall of the river is about 40 feet to the mile. The elevation at Canon City is 5,300 feet; at the Colorado-Kansas State line, 220 miles below, the elevation is 3,350 feet, making the average fall about 9 feet per mile. At the mouth the river has an elevation slightly exceeding 100 feet above sea level.

The drainage basin of Arkansas River contains about 1,000 square miles of merchantable timber land and considerably more than that amount of woodland; the rest, except for the considerable area under cultivation, may be classed as barren and sagebrush land.

The principal source of the water which the river bears to the plains is the precipitation along the crest of the high ranges. This is mainly in the form of snow, and amounts to 20 or 30 inches each year. From the foothills to Arkansas City the precipitation ranges from 12 to 35 inches, being 25 to 35 inches in the last 100 miles below Hutchinson. The natural storage in the basin is limited to a few mountain lakes of glacial origin.

The streams of this drainage area are subject to floods of two kinds—the annual spring floods caused by the melting of the snows in the headwater regions and floods caused by the violent storms, locally known as cloudbursts, in the foothills and plains regions. Occasionally, too, the river runs dry, and many of the tributaries are intermittent in character.

As altitudes within this basin range from 14,000 feet almost down to sea level, the climatic conditions vary greatly. In the mountainous sections the winters are severe, the snowfall is heavy, and the rivers have a thick ice cover for several months. As the altitude decreases the winters become milder.

About half a million acres of land are under irrigation on Arkansas River and its tributaries in Colorado, but beyond the Colorado line only a very few thousand acres are irrigated. The Garden City project of the United States Reclamation Service will eventually provide for the irrigation of probably 15,000 acres in the Arkansas Valley in western Kansas, principally by pumping the underflow.

Numerous reservoirs now in operation along the Arkansas, together with direct diversions for irrigation, provide for the use of the greater part of the flow of Arkansas River in Colorado. The largest reservoirs are in the system of the Great Plains Reservoir Co., on the north side of the river in the eastern part of the State. The reservoirs of this system are supplied by feeder canals, and have a com-

bined capacity of almost 200,000 acre-feet. Other reservoirs now contemplated or under construction, on the tributaries of the Arkansas, will provide for the irrigation of a large additional area. These reservoirs are necessitated by the intermittent character of the streams upon which they are situated. The basin contains many excellent reservoir sites. The flood on the Arkansas in October, 1908, illustrates the possibility for additional storage in some of them.[1]

On account of the use of water for irrigation in the open country, power development is necessarily confined to the upper reaches of the Arkansas and its tributaries. It seems probable that, with proper storage, about 100,000 horsepower can be developed. Somewhat over 5,000 horsepower is now being used.

The years of greatest average flow on the upper Arkansas since the beginning of measurements seem to have been 1891 and 1899. The flow in 1905 was also very high and that in 1906 and 1907 was nearly as great. The year of lowest flow is 1902, while 1908 is second.

ARKANSAS RIVER AT GRANITE, COLO.

This station, which was established April 6, 1910, by the State engineer of Colorado, by whom it is maintained, is located below the mouth of Lake Creek and above mouths of Lost Canon and Clear creeks. The discharge is affected by the Twin Lakes reservoir and by a flume used by a placer mine at Granite, taking water out of Lake Creek and returning it to the Arkansas below the station.

A Bristol automatic and a slope gage, both at the same datum, are located on the left bank of stream about 500 feet above the Denver & Rio Grande Railroad depot at Granite. Measurements are made from a car and cable, about one-third mile above the depot. The measuring section is good, as the bed of the stream consists of gravel and small bowlders and is permanent. Banks are composed chiefly of gravel and are not liable to overflow except at extreme high stages. Gage heights are affected by ice during the winter.

Discharge measurements of Arkansas River at Granite, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet*	*Sec.-ft.*
Apr. 7	Thos. Grieve	68	82	1.70	150
May 6	C. L. Chatfield	77	203	3.04	1,033
28	Thos. Grieve	74	180	[a] 2.83	804
Aug. 5	Grieve and Christiansen	71	108	2.00	267
8	A. A. Weiland	72	119	2.25	355
Sept. 19	Thos. Grieve	66	65.9	1.58	116
Oct. 28	[b] ....do	57	58.5	1.32	74

[a] Twin Lakes stopped flowing during this measurement. Area and velocity would indicate that gage height was about 2.83.
[b] By wading at various sections

[1] For report on this flood see Water-Supply Paper U. S. Geol. Survey No. 247, p. 35.

Daily gage height, in feet, of Arkansas River at Granite, Colo., for 1910.

[Geo. Morrison, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.6	3.65	3.1	2.25	2.6	1.7	1.8	1.3
2	.....	2.65	3.5	3.1	2.2	2.6	1.7	1.7	1.3
3	.....	2.75	3.5	3.05	2.15	2.1	1.7	1.7	1.4
4	.....	2.95	3.5	3.05	2.05	1.6	1.6	1.7	1.3
5	.....	2.95	3.5	3.0	1.85	1.6	1.6	1.75	1.2
6	1.8	3.05	3.45	3.0	1.8	1.55	1.6	1.4	1.35
7	1.75	3.05	3.4	2.2	1.7	1.5	1.6	1.45	1.35
8	1.85	2.95	3.2	2.2	1.75	1.45	1.55	1.4	1.4
9	2.0	3.1	3.2	2.5	1.75	1.5	1.6	1.4	1.4
10	2.05	3.2	3.2	2.4	1.85	1.45	1.3	1.4	1.4
11	2.05	3.2	3.2	2.25	1.9	1.5	1.3	1.4	1.4
12	2.05	3.25	3.1	2.1	1.95	1.5	1.45	1.4	1.4
13	2.05	3.5	3.1	2.1	1.85	1.5	1.3	1.35	1.4
14	1.95	3.2	3.1	2.1	1.85	1.4	1.5	1.4	.....
15	1.95	3.0	3.1	2.2	1.7	1.4	1.45	1.35	.....
16	1.9	2.7	3.2	2.15	1.65	1.55	1.6	1.35	.....
17	1.9	2.65	3.1	2.05	1.65	1.6	1.5	1.3	.....
18	1.9	2.6	2.85	2.05	1.80	1.65	1.45	1.35	.....
19	1.95	2.5	2.8	2.1	1.85	1.6	1.6	1.35	.....
20	2.6	2.6	2.85	2.1	1.85	1.6	1.4	1.3	.....
21	2.9	2.65	3.0	2.35	1.80	1.8	1.65	1.35	.....
22	2.9	3.25	3.0	2.35	1.75	1.65	1.9	1.4	.....
23	2.5	3.2	3.1	2.2	1.75	1.7	1.4	1.3	.....
24	2.45	3.1	3.1	2.1	1.7	1.6	1.4	1.3	.....
25	2.95	3.05	3.1	2.05	1.65	1.6	1.4	1.35	.....
26	2.75	2.9	3.1	2.0	1.65	1.9	1.4	1.4	.....
27	2.3	3.05	3.2	1.95	1.65	2.15	1.35	1.4	.....
28	3.0	3.1	3.1	2.0	1.55	1.8	1.35	1.35	.....
29	2.2	2.95	3.05	2.25	1.8	1.6	1.35	1.35	.....
30	2.4	3.45	3.05	2.5	2.4	1.7	1.35	1.35	.....
31	.....	3.65	.....	2.2	2.55	.....	1.45	.....	.....

Daily discharge, in second-feet, of Arkansas River at Granite, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	595	1,745	1,090	372	595	150	180	70
2	.....	638	1,550	1,090	345	595	150	150	70
3	.....	728	1,550	1,035	322	300	150	150	85
4	.....	925	1,550	1,035	278	120	120	150	70
5	.....	925	1,550	980	198	120	120	165	55
6	180	1,035	1,490	980	180	110	120	85	78
7	165	1,035	1,430	345	150	100	120	92	78
8	198	925	1,200	345	165	92	110	85	85
9	255	1,090	1,200	520	165	100	120	85	85
10	278	1,200	1,200	455	198	92	70	85	85
11	278	1,200	1,200	372	215	100	70	85	85
12	278	1,255	1,090	300	235	100	92	85	85
13	278	1,550	1,090	300	198	100	70	78	85
14	235	1,200	1,090	300	198	85	100	85	.....
15	235	980	1,090	345	150	85	92	78	.....
16	215	680	1,200	322	135	110	120	78	.....
17	215	638	1,090	278	135	120	100	70	.....
18	215	595	822	278	180	135	92	78	.....
19	235	520	775	300	198	120	120	78	.....
20	595	595	822	300	198	120	85	70	.....
21	870	638	980	428	180	180	135	78	.....
22	870	1,255	980	428	165	135	215	85	.....
23	520	1,200	1,090	345	165	150	85	70	.....
24	488	1,090	1,090	300	150	120	85	70	.....
25	925	1,035	1,090	278	135	120	85	78	.....
26	728	870	1,090	255	135	215	85	85	.....
27	400	1,035	1,200	235	135	322	78	85	.....
28	980	1,090	1,090	255	110	180	78	78	.....
29	345	925	1,035	372	180	120	78	78	.....
30	455	1,490	1,035	520	455	150	78	78	.....
31	.....	1,745	.....	345	558	.....	92	.....	.....

NOTE.—These discharges were obtained from a rating curve which is well defined between 70 and 980 second-feet.

Monthly discharge of Arkansas River at Granite, Colo., for 1910.

[Drainage area, 425 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
Apr. 6–30	925	165	417	0.981	0.91	20,700
May	1,745	520	990	2.33	2.69	60,900
June	1,745	775	1,180	2.78	3.10	70,200
July	1,090	235	475	1.12	1.29	29,200
August	558	110	212	.498	.58	13,100
September	595	85	166	.391	.44	9,880
October	215	70	105	.247	.29	6,460
November	180	70	93	.219	.24	5,530
Dec. 1–13	85	70	78	.184	.09	2,010
The period						218,000

ARKANSAS RIVER AT SALIDA, COLO.

A station was maintained on Arkansas River at Salida under the direction of the United States Geological Survey from 1895 to 1903.[1] The station was reestablished November 3, 1909, by the State engineer of Colorado, who placed a Bristol automatic gage with an auxiliary slope gage about a block below the concrete bridge on the road from town to the Denver & Rio Grande Railroad depot. The records furnish data concerning the amount of water available for irrigation.

The new and old stations bear the same relation to tributaries and diversions, but are at different sections.

The gage has no determined relation to the gage used in 1903. Discharge measurements are made from the concrete bridge.

On account of springs in the vicinity of the station, the channel is open throughout the winter months, making a very favorable location for the gage.

Discharge measurements of Arkansas River at Salida, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Jan. 19[a]	Thos. Grieve	66	104	0.70	221
Feb. 26[a]	do	66	100	.70	226
May 5	do	81	226	2.75	1,270
25	do	83	259	2.92	1,600
Aug. 4	Grieve and Christiansen	69	140	1.35	478
Sept. 18[a]	Thos. Grieve	68	103	.76	267

[a] Made by wading.

[1] For description see Water-Supply Paper U. S. Geol. Survey No. 99, p. 301.

Daily gage height, in feet, of Arkansas River at Salida, Colo., for 1910.

[Howard Snedden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.9	0.75	0.75	1.3	2.9	3.55	2.85	1.35	1.5	0.95	0.8	0.6
2	.9	.7	.8	1.45	2.55	3.65	2.75	1.3	1.85	.7	.75	.6
3	.8	.65	.8	1.45	2.2	3.9	2.6	1.25	1.85	.7	.75	.6
4	.75	.6	.85	1.35	2.7	3.8	2.6	1.35	1.25	.65	.75	.65
5	.6	.6	.9	1.25	2.75	3.8	2.55	1.5	1.15	.65	.8	.5
6	.55	.6	.95	1.1	2.8	4.1	2.45	1.4	1.05	.6	.8	.5
7	.55	.65	.95	1.05	2.85	3.8	1.95	1.2	1.0	.65	.75	.55
8	.7	.65	1.0	1.05	2.9	3.55	1.7	1.15	.95	.7	.75	.6
9	.7	.6	1.0	1.2	3.0	3.35	1.7	1.2	.9	.8	.75	.6
10	.75	.6	.8	1.3	3.35	3.15	1.8	1.2	.55	.7	.7	.6
11	.75	.6	.75	1.35	3.55	3.05	1.65	1.2	.4	.6	.7	.6
12	.75	.65	.75	1.35	3.8	2.95	1.5	1.2	.45	.65	.7	.55
13	.65	.6	.75	1.4	3.85	3.05	1.5	1.2	.45	.65	.75	.5
14	.7	.7	.75	1.35	3.35	3.2	1.4	1.2	.5	.65	.7	.45
15	.75	.65	.8	1.2	2.95	3.25	1.55	1.15	.45	.7	.75	.4
16	.8	.6	.8	1.2	2.5	3.35	1.55	1.0	.55	.75	.7	.45
17	.8	.6	.8	1.25	2.35	3.25	1.3	1.0	.6	.85	.65	.4
18	.7	.65	.85	1.2	2.25	3.0	1.05	1.1	.75	.75	.65	.....
19	.75	.65	.9	1.2	2.1	3.1	1.2	1.25	.95	.85	.7	.....
20	.7	.7	1.0	1.3	2.05	3.15	1.2	1.3	.95	.8	.65	.....
21	.75	.7	1.0	1.4	2.25	3.0	1.4	1.2	1.0	.75	.65	.....
22	.8	.7	1.1	1.4	3.05	2.85	1.4	1.15	1.15	1.2	.7	.....
23	.8	.7	1.2	1.45	3.1	3.05	1.3	1.25	.95	.95	.7	.....
24	.8	.7	1.15	1.5	3.1	3.0	1.25	1.2	.95	.8	.7	.....
25	.8	.8	1.15	1.7	2.9	2.95	1.2	1.1	.9	.75	.7	.....
26	.65	.75	1.2	2.0	2.75	2.9	1.1	1.1	.85	.75	.7	.....
27	.65	.65	1.1	2.3	2.75	2.95	.95	1.1	1.25	.7	.65	.....
28	.65	.65	1.15	2.6	3.0	2.95	1.1	1.15	1.25	.7	.6	.....
29	.75	.....	1.15	3.25	3.4	2.85	1.5	.95	.8	.7	.65	.....
30	.65	.....	1.05	3.15	3.95	2.8	1.8	1.1	.95	.7	.6	.....
31	.7	.....	1.2	.....	3.9	.....	1.55	1.4	.....	.75	.....	.....

Daily discharge, in second-feet, of Arkansas River at Salida, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	275	238	238	415	1,375	2,200	1,535	480	555	325	280	225
2	275	225	250	478	1,115	2,300	1,445	455	758	250	265	225
3	250	212	250	478	880	2,555	1,315	435	758	250	265	225
4	238	200	262	435	1,225	2,450	1,315	480	435	238	265	238
5	200	200	275	395	1,262	2,450	1,272	555	395	238	280	205
6	190	200	292	340	1,310	2,665	1,190	505	358	225	280	205
7	190	212	292	325	1,360	2,450	822	415	340	238	265	215
8	225	212	310	325	1,410	2,200	665	395	325	250	265	225
9	225	200	310	375	1,450	2,003	665	415	310	280	265	225
10	238	200	250	415	1,820	1,813	725	415	215	250	250	225
11	238	200	238	435	2,000	1,718	635	415	185	225	250	225
12	238	212	238	435	2,240	1,625	555	415	195	238	250	215
13	212	200	238	455	2,280	1,718	555	415	195	238	265	205
14	225	225	238	435	1,840	1,860	530	415	205	238	250	195
15	238	212	250	375	1,500	1,908	580	395	195	250	265	185
16	250	200	250	375	1,160	2,003	580	340	215	265	250	195
17	250	200	250	395	1,070	1,908	455	340	225	295	238	185
18	225	212	262	375	1,010	1,670	358	375	265	265	238	185
19	238	212	275	375	920	1,765	415	435	325	295	250	185
20	225	225	310	415	900	1,813	415	455	325	280	238	185
21	238	225	310	455	1,040	1,670	505	415	340	265	238	185
22	250	225	340	455	1,670	1,535	505	395	395	415	250	185
23	250	225	375	478	1,720	1,718	455	435	325	325	250	180
24	250	225	358	500	1,740	1,670	435	415	325	280	250	180
25	250	250	358	600	1,580	1,625	415	375	310	265	250	180
26	212	238	375	760	1,445	1,580	375	375	295	265	250	180
27	212	212	340	945	1,445	1,625	325	375	435	250	238	175
28	212	212	358	1,150	1,670	1,625	375	395	435	250	225	175
29	238	.....	358	1,640	2,050	1,535	555	325	280	250	238	175
30	212	.....	325	1,562	2,608	1,490	725	375	325	250	225	175
31	225	.....	375	.....	2,255	.....	580	505	.....	265	.....	175

NOTE.—These discharges were obtained as follows:
Jan. 1 to May 5, from a rating curve which is well defined between 225 and 1,080 second-feet.
May 6 to 24, indirect method for shifting channels.
May 25 to Dec. 17, from a rating curve which is well defined between 200 and 1,700 second-feet.
Dec. 18 to 31, estimated.

Monthly discharge of Arkansas River at Salida, Colo., for 1910.

[Drainage area, 1,160 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	275	190	232	0.200	0.23	14,300
February	250	200	215	.185	.19	11,900
March	375	238	295	.254	.29	18,100
April	1,640	325	553	.477	.53	32,900
May	2,608	880	1,530	1.32	1.52	93,900
June	2,665	1,490	1,910	1.64	1.83	113,600
July	1,535	325	686	.591	.68	42,200
August	555	325	417	.359	.41	25,600
September	758	185	341	.294	.33	20,300
October	415	225	265	.228	.26	16,300
November	280	225	253	.218	.24	15,100
December	238	.....	198	.171	.20	12,200
The year	2,665	.....	575	.496	6.71	418,000

ARKANSAS RIVER AT CANON CITY, COLO.

This station, which was established April 17, 1889, is located at the mouth of the canyon, just below the suspension footbridge at Hot Springs Hotel, about 1½ miles above the Denver & Rio Grande Railroad depot at Canon City, Colo.

The records at this point show the greater part of the run-off of the river and are valuable both for power and irrigation projects.

Grape Creek enters about one-eighth of a mile above the station and Oil Creek comes in about 5 miles below. The drainage area comprises about 3,000 square miles. North and South Canyon ditches divert water above the station, and their flow is not included in the run-off. No accurate records have been kept of the discharge in these canals, but the combined flow is from 50 to 100 second-feet during the irrigation season. Some water is also diverted for the irrigation of a few thousand acres on the upper Arkansas and its tributaries.

The flow of the river is affected by ice for three or four months during the winter season.

On October 4, 1895, a new rod gage was established on the left bank, opposite the original gage and at the same datum. This gage read 0.4 foot lower than the old gage at low stages, but at high water both gages read the same. This new gage was used until August 26, 1902, when another gage was established on the right bank at the datum of the original gage, though it is situated a short distance farther downstream. The present chain gage is a few feet upstream from the cable. In September, 1909, the State engineer established a Bristol self-recording gage near the location of the chain gage, but with a datum 2 feet higher. Both gages have been read since that time. Measurements are made from a cable, or by wading at low stages.

As the stream bed is rough it is difficult to obtain very accurate measurements at high stages. Moreover, the channel is subject to considerable shifting, which makes the estimates of daily discharge rather uncertain, especially after violent flood.

Discharge measurements of Arkansas River at Canon City, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19[a]	Thos. Grieve	86	132	3.9	402
Feb. 23	....do	95	158	4.04	496
26	Lyon and Russell	96	159	4.0	477
Apr. 4	G. H. Russell	97	168	4.32	611
10	Thos. Grieve	97	180	4.18	559
30	Lyon and Lamb	101	359	5.82	2,290
May 5	Thos. Grieve	104	286	5.35	1,540
29	....do	107	347	5.82	2,110
June 10	Bolster and Lyon	104	336	5.57	1,770
23	G. H. Russell	103	300	5.28	1,500
July 22	....do	95	158	4.15	520
Aug. 3	Thos. Grieve	93	151	4.1	572
12	G. J. Lyon	99	122	3.95	453
17	Thos. Grieve	87	105	3.71	343
17[b]	....do	93	107	3.71	360
Sept. 16[b]	G. H. Russell	80	92	3.62	249
20	Thos. Grieve	92	121	3.86	345
Oct. 1	S. T. Harding	92	129	3.83	407
28[c]	....do	72	107	3.7	345
Nov. 24[b]	Padgett and Miles	76	104	3.7	284

[a] Discharge slightly affected by ice. [b] Made by wading. [c] Made from suspension bridge.

Daily gage height, in feet, of Arkansas River at Canon City, Colo., for 1910.

[S. R. McKissick, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.30	3.9	3.85	4.3	5.65	6.55	5.1	4.3	4.25	3.8	3.6	3.55
2	4.3	3.8	4.0	4.25	5.45	6.5	5.1	4.15	4.3	3.7	3.85	3.5
3	4.05	3.75	4.0	4.35	5.15	6.5	5.05	4.2	4.3	3.5	3.8	3.5
4	3.85	3.7	4.05	4.25	5.25	6.45	5.0	4.15	4.05	3.5	3.8	3.55
5	3.9	3.7	4.05	4.3	5.35	6.35	5.0	4.35	3.8	3.4	3.85	3.5
6	3.7	3.75	4.3	4.1	5.3	6.2	4.9	4.35	3.8	3.5	3.8	3.45
7	3.65	3.85	4.3	4.05	5.3	6.05	4.75	4.05	3.7	3.5	3.6	3.55
8	3.8	3.95	4.3	4.1	5.4	5.85	4.3	3.95	3.6	3.5	3.6	3.65
9	3.95	3.75	4.3	4.1	5.4	5.65	4.3	4.3	3.6	3.55	3.6	3.75
10	4.05	3.8	4.15	4.15	5.65	5.6	4.3	4.05	3.5	3.55	3.6	3.65
11	4.0	3.8	4.05	4.2	5.9	5.5	4.25	3.95	3.5	3.45	3.6	3.65
12	4.05	3.85	4.05	4.25	6.05	5.45	4.2	3.95	3.5	3.4	3.6	3.7
13	4.0	3.9	4.00	4.35	6.3	5.45	4.05	4.0	3.5	3.5	3.6	3.75
14	4.0	3.95	4.05	4.55	6.1	5.55	4.0	3.95	3.55	3.4	3.6	3.7
15	4.1	3.9	4.05	4.35	5.9	5.45	3.9	3.9	3.6	3.5	3.6	3.7
16	4.05	3.5	4.05	4.35	5.55	5.5	3.9	3.8	3.6	3.5	3.65	3.65
17	4.1	3.5	4.05	4.3	5.35	5.6	3.85	3.7	3.65	3.7	3.65	3.7
18	3.95	3.65	4.1	4.25	5.3	5.3	3.8	3.75	3.65	3.75	3.55	3.65
19	3.9	3.9	4.15	4.2	5.1	5.15	3.8	3.85	3.95	3.7	3.6	3.65
20	3.95	3.9	4.2	4.2	5.1	5.1	4.0	3.85	3.9	3.95	3.65	3.8
21	3.9	3.9	4.25	4.25	5.15	5.15	3.95	3.8	3.75	3.7	3.6	3.8
22	3.95	4.0	4.25	4.3	5.8	5.15	4.15	3.8	3.75	3.7	3.6	3.75
23	4.0	4.05	4.3	4.35	5.75	5.15	4.1	3.8	3.8	4.15	3.6	3.65
24	4.05	3.9	4.3	4.4	5.6	5.4	4.0	3.9	3.65	3.7	3.65	3.7
25	4.0	3.95	4.3	4.5	5.5	5.2	3.9	3.8	3.7	3.7	3.7	3.7
26	3.8	4.0	4.25	4.7	5.45	5.2	3.8	3.8	3.7	3.7	3.65	3.7
27	3.8	3.8	4.3	4.9	5.5	5.2	3.7	3.75	3.75	3.7	3.6	3.7
28	3.75	3.85	4.2	5.3	5.65	5.3	3.7	3.75	4.15	3.7	3.6	3.65
29	3.85	.....	4.25	5.85	5.6	5.15	4.95	3.75	3.85	3.6	3.6	3.55
30	3.85	.....	4.15	5.8	6.45	5.1	4.4	3.7	3.55	3.55	3.6	3.55
31	3.75	.....	4.25	.....	6.65	.....	4.6	4.0	.....	3.5	.....	3.5

NOTE.—Gage heights affected by ice, Jan. 1–19.

Daily discharge, in second-feet, of Arkansas River at Canon City, Colo., for 1910.

Day.	Jan.[a]	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	340	410	385	640	1,920	3,160	1,310	640	608	360	275	258
2	340	360	460	608	1,680	3,090	1,310	545	640	315	385	240
3	340	338	460	675	1,360	3,090	1,260	575	640	240	360	240
4	340	315	488	675	1,460	3,020	1,210	545	488	240	360	258
5	340	315	488	575	1,570	2,880	1,210	675	360	208	385	240
6	340	338	640	515	1,520	2,670	1,120	675	360	240	360	224
7	340	385	640	488	1,520	2,460	982	488	315	240	275	258
8	340	435	640	515	1,620	2,180	640	435	275	240	275	295
9	340	338	640	515	1,620	1,920	640	640	275	258	275	338
10	340	360	545	545	1,920	1,860	640	488	240	258	275	295
11	340	360	488	575	2,250	1,740	608	435	240	224	275	295
12	340	385	488	608	2,460	1,680	575	435	240	208	275	315
13	340	410	460	675	2,810	1,680	488	460	240	240	275	338
14	340	435	488	822	2,530	1,800	460	435	258	208	275	315
15	340	410	488	675	2,250	1,680	410	410	275	240	275	315
16	340	240	488	675	1,800	1,740	410	360	275	240	295	295
17	340	240	488	640	1,570	1,860	385	315	295	315	295	315
18	340	295	515	608	1,520	1,520	360	338	295	338	258	295
19	410	410	545	575	1,310	1,360	360	385	435	315	275	295
20	435	410	575	575	1,310	1,310	460	385	410	435	295	360
21	410	410	608	608	1,360	1,360	435	360	338	315	275	360
22	435	460	608	640	2,120	1,360	545	360	338	315	275	338
23	460	488	640	675	2,050	1,360	515	360	360	545	275	295
24	488	410	640	710	1,860	1,620	460	410	295	315	295	315
25	460	435	640	785	1,740	1,410	410	360	315	315	315	315
26	360	460	608	940	1,680	1,410	360	360	315	315	295	315
27	360	360	640	1,120	1,740	1,410	315	338	338	315	275	315
28	338	385	575	1,520	1,920	1,520	315	338	545	315	275	295
29	385	.....	608	2,180	1,860	1,360	1,160	338	385	275	275	258
30	385	.....	545	2,120	3,020	1,310	710	315	258	258	275	258
31	338	.....	608	.....	3,300	.....	860	460	.....	240	.....	240

[a] 340 second-feet estimated mean per day Jan. 1 to 18.

NOTE.—These discharges are based on a rating curve which is fairly well defined between 250 and 2,400 second-feet. Discharge Jan. 1 to 18 estimated on account of ice.

Monthly discharge of Arkansas River at Canon City, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	367	22,600	D.
February	488	240	378	21,000	B.
March	640	385	553	34,000	A.
April	2,180	488	783	46,600	A.
May	3,300	1,310	1,890	116,000	A.
June	3,160	1,310	1,890	112,000	A.
July	1,310	315	675	41,500	A.
August	675	315	441	27,100	A.
September	640	240	355	21,100	B.
October	545	208	287	17,600	B.
November	385	258	295	17,600	B.
December	360	224	293	18,000	C.
The year	3,300	.....	685	495,000	

ARKANSAS RIVER AT PUEBLO, COLO.

This station was established September 30, 1894, at the Santa Fe Avenue Bridge, Pueblo, Colo. On July 10, 1898, another gage was established on the east side of Main Street Bridge, which was used until March 3, 1900. Then a staff gage fastened to the retaining wall, a short distance below the Union Avenue Bridge, was used to July 14,

1902. From July 14, 1902, until July 7, 1905, readings were taken at a rod gage, having a different datum, located just above this bridge. The present chain gage on the Main Street Bridge has been in use since July 7, 1905. Measurements are made from this bridge.

As this station is near the head of the principal irrigated portion of the Arkansas Valley and above the head gates of the larger canals, the data are especially valuable to water superintendents and the State water commissioners in making distribution of water to the canals below.

No important tributaries enter within several miles above the station. Fountain Creek enters just below, and the Huerfano, the most important tributary in that vicinity, comes in about 20 miles below.

At various points above this station water is diverted for the irrigation of about 70,000 acres of land. The diversion for the Pueblo water supply also takes out above. Additional filings for irrigation above this station on the Arkansas are impossible, except for storage on some of the minor tributaries.

Slush and flowing ice are usually found at this station during the winter months and sometimes the river is frozen over or affected by ice jams below, but the results are rarely influenced by ice conditions for more than two months during the year. As noted above, numerous changes have been made in the datum of the gage.

Very good measurements can be obtained at this point, although the channel sometimes shifts considerably during floods.

Discharge measurements of Arkansas River at Pueblo, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 20[a]	Thos. Grieve	72	147	2.55	478
Feb. 23	....do	75	147	2.80	[b]444
25	G. H. Russell	114	178	2.65	575
Mar. 3	Thos. Grieve	150	228	2.88	835
16[c]	....do	69	104	2.24	351
22	....do	150	164	2.55	556
31[d]	C. L. Chatfield	75	124	2.45	478
Apr. 5	G. H. Russell	136	181	2.58	606
28	A. A. Weiland	151	275	3.28	1,220
29	Lyon and Lamb	150	339	3.62	1,560
30	A. A. Weiland	151	422	4.07	2,170
May 14	....do	151	445	4.50	2,500
31	....do	151	511	4.86	3,020
June 9	Bolster and Lyon	151	377	3.93	1,760
9	....do	151	374	3.91	1,760
23	G. H. Russell	151	310	3.46	1,260
July 23	....do	74	161	2.40	396
Aug. 16	....do	70	136	2.20	322
Sept. 16	....do	64	98	1.87	185
Oct. 4	S. T. Harding	64	89	1.88	160
Nov. 23	Padgett and Miles	122	129	2.10	313

[a] Made at Victoria Avenue Bridge. Ice along bank.
[b] Discharge liable to error; meter froze.
[c] Made at Victoria Avenue Bridge.
[d] Made at Union Avenue Bridge.

Daily gage height, in feet, of Arkansas River at Pueblo, Colo., for 1910.

[David J. Cox, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.25	2.6	2.5	2.6	3.9	5.05	3.6	2.6	2.5	2.0	2.2	2.0
2	3.0	2.5	2.55	2.6	3.75	4.9	3.45	2.6	2.7	2.0	2.2	2.0
3	2.9	2.45	2.65	2.85	3.65	4.75	3.4	2.3	2.7	1.85	2.2	2.05
4	2.6	2.4	2.65	2.75	3.35	4.7	3.4	3.85	2.6	1.9	2.15	2.05
5	2.8	2.4	2.7	2.65	3.6	4.6	3.35	3.25	2.2	1.9	2.2	2.1
6	2.9	2.5	2.9	2.55	3.65	4.5	3.25	2.95	2.1	1.75	2.2	2.05
7	3.05	2.45	2.85	2.5	3.5	4.3	3.2	2.8	2.05	1.85	2.25	2.0
8	3.25	2.45	2.7	2.4	3.65	4.05	3.0	2.6	1.95	1.9	2.2	2.05
9	3.6	2.45	2.7	2.4	3.7	3.95	2.6	2.45	1.85	1.7	2.15	2.0
10	3.75	2.4	2.6	2.6	3.95	3.9	2.75	2.65	1.85	1.85	2.15	2.2
11	3.9	2.45	2.4	2.6	4.1	3.8	2.7	2.55	1.8	2.05	2.15	2.05
12	3.95	2.4	2.25	2.6	4.25	3.8	2.7	2.45	1.8	1.85	2.15	2.05
13	3.7	2.4	2.25	2.75	4.5	3.85	3.2	2.75	1.85	2.0	2.1	2.0
14	3.3	2.45	2.3	2.75	4.55	3.8	2.5	2.6	2.3	2.05	2.15	2.05
15	3.15	2.5	2.35	2.65	4.4	3.85	2.25	2.6	1.85	1.9	2.2	1.95
16	3.1	2.35	2.3	2.55	3.9	3.9	2.3	2.35	1.9	2.1	2.3	1.9
17	3.05	2.1	2.3	2.5	3.7	4.1	2.3	2.0	1.8	2.1	2.25	1.85
18	2.85	2.3	2.3	2.7	3.55	3.8	2.25	2.2	1.9	2.15	2.25	2.0
19	2.8	2.35	2.25	2.55	3.55	3.5	2.2	1.95	1.9	2.2	2.25	2.05
20	2.7	2.5	2.45	2.6	3.5	3.4	2.3	2.1	2.3	2.25	2.25	1.9
21	2.6	2.5	2.6	2.65	3.6	3.45	2.2	2.4	2.15	2.25	2.25	2.0
22	2.7	2.5	2.6	2.75	3.95	3.5	2.3	2.25	2.1	2.3	2.15	2.2
23	2.7	2.6	2.65	2.75	4.15	3.5	2.4	2.15	2.1	2.35	2.1	2.05
24	2.8	2.7	2.7	2.75	4.0	3.5	2.35	2.15	2.05	2.3	2.1	2.1
25	2.8	2.65	2.65	2.85	3.9	3.65	2.3	2.2	1.95	2.35	2.05	2.15
26	2.65	2.8	2.6	3.0	3.85	3.65	2.2	2.15	1.95	2.35	2.15	2.1
27	2.6	2.5	2.7	3.15	3.7	3.6	2.1	2.15	1.9	2.25	2.15	2.05
28	2.6	2.55	2.6	3.3	3.8	3.65	2.0	2.05	2.1	2.3	2.15	2.05
29	2.55	.....	2.6	3.6	4.1	3.7	2.95	2.05	2.1	2.3	2.15	2.05
30	2.6	.....	2.6	4.1	4.4	3.6	4.1	2.0	2.1	2.2	2.05	2.05
31	2.55	.....	2.5	.....	4.95	.....	3.0	2.1	.....	2.3	.....	2.1

NOTE.—Gage heights probably affected by ice Jan. 1 to 20. Ice may also have existed at times during December, but the gage heights were probably not materially changed thereby.

Daily discharge, in second-feet, of Arkansas River at Pueblo, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	350	515	520	590	1,740	3,250	1,400	590	520	220	330	220
2	350	450	555	590	1,560	3,040	1,240	590	670	220	330	220
3	350	422	630	795	1,460	2,840	1,190	390	670	150	330	245
4	350	395	630	710	1,140	2,770	1,190	1,860	590	170	300	245
5	350	395	670	630	1,400	2,640	1,140	1,180	330	170	330	270
6	375	450	840	555	1,460	2,500	1,040	885	270	110	330	245
7	375	422	795	520	1,290	2,240	990	750	245	150	360	220
8	375	422	670	455	1,460	1,920	810	590	195	170	330	245
9	375	422	670	455	1,510	1,800	515	488	150	90	300	220
10	375	395	590	590	1,800	1,740	615	630	150	150	300	330
11	400	422	455	590	1,980	1,620	580	555	130	245	300	245
12	400	395	360	590	2,180	1,620	580	488	130	150	300	245
13	400	395	360	710	2,500	1,680	990	710	150	220	270	220
14	400	422	390	710	2,570	1,620	450	590	390	245	300	245
15	400	450	422	630	2,370	1,680	315	590	150	170	330	195
16	450	368	390	555	1,740	1,740	340	422	170	270	390	170
17	450	240	390	520	1,510	1,980	340	220	130	270	360	150
18	450	340	390	670	1,340	1,620	315	330	170	300	360	220
19	450	368	360	555	1,340	1,290	290	195	170	330	360	220
20	480	450	487	590	1,290	1,190	340	270	390	360	390	195
21	515	450	590	630	1,400	1,240	290	455	300	360	360	220
22	580	450	590	710	1,800	1,290	340	360	270	390	300	330
23	580	515	630	710	2,040	1,290	395	300	270	422	270	245
24	650	580	670	710	1,860	1,290	368	360	245	390	270	270
25	650	548	630	795	1,740	1,460	340	330	195	422	245	300
26	548	650	590	930	1,680	1,460	290	300	195	422	300	270
27	515	450	670	1,080	1,510	1,400	240	300	170	360	300	245
28	515	482	590	1,230	1,620	1,460	200	245	270	390	300	245
29	482	.....	590	1,560	1,980	1,510	768	245	270	390	300	245
30	515	.....	590	2,180	2,370	1,400	1,980	220	270	330	245	245
31	482	.....	520	.....	3,110	.....	810	270	.....	390	.....	270

NOTE.—These discharges were obtained as follows:
Jan. 1 to 20 estimated on account of ice.
Jan. 21 to Feb. 28 and May 1 to July 31 based on a rating curve which is well defined between 250 and 3,000 second-feet.
Mar. 1 to Aug. 30 based on a rating curve which is well defined between 250 and 2,700 second-feet.
Aug. 1 to Dec. 31 based on a rating curve which is not well defined.

Monthly discharge of Arkansas River at Pueblo, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	650	.....	450	27,700	C.
February	650	240	438	24,300	B.
March	840	360	556	34,200	A.
April	2,180	455	752	44,700	A.
May	3,110	1,140	1,770	109,000	B.
June	3,250	1,190	1,820	108,000	A.
July	1,980	200	667	41,000	A.
August	1,860	195	505	31,100	B.
September	670	130	274	16,300	B.
October	422	90	272	16,700	B.
November	390	245	315	18,700	B.
December	330	150	240	14,800	C.
The year	3,250	90	672	486,000	

ARKANSAS RIVER NEAR NEPESTA, COLO.

This station, which is located at the dam of the Oxford Farmers Canal Co., about 1½ miles above Nepesta, has been maintained at various times and was reestablished in 1909 by the State engineer, by whom it is maintained.

A vertical staff gage is spiked to a pile above upper face of dam near right bank. On August 23, 1910, a Bristol automatic gage was installed. Both gages are at the same datum. Measurements are made from the highway bridge seven-eighths of a mile below the dam during high water and by wading at low water.

The section is fair, the bed of the stream is sandy and shifting. Gage heights are affected by ice during winter.

Discharge measurements of Arkansas River near Nepesta, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Jan. 24	Thos. Grieve	134	338	[a] 8.30	1,070
Mar. 2	do	159	175	.80	574
Apr. 9	do	152	.....	.60	422
30	C. L. Chatfield	.....	398	1.50	1,680
Sept. 16	A. A. Weiland	47	384	.44	90

[a] Distance from top of cylindrical pier, right, upstream side, to water surface.
[b] Made by wading.

Daily gage height, in feet, of Arkansas River near Nepesta, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.0	0.7	0.7	1.4	1.7	1.0	1.1	0.45	0.0	0.7	.....
2	.....	1.0	.8	.7	1.4	1.7	.9	1.8	.55	.0	.55	.....
3	.....	1.0	.9	.7	1.3	1.5	.9	.7	.55	.0	.75	.....
4	.....	1.0	1.0	.9	1.3	1.5	.9	1.7	.5	.0	.75	.....
5	.....	1.0	.8	.9	1.4	1.4	.8	2.8	.4	.25	.75	.....
6	.....	.8	.8	.7	1.4	1.4	.7	1.5	.3	.0	.6	.....
7	.....	.8	.9	.8	1.1	1.2	.7	1.0	.5	.0	.45	.....
8	.....	.8	.9	.6	1.2	1.2	.7	.7	.45	.0	.5	.....
9	.....	.7	.9	.6	1.25	1.1	.5	.7	.4	.2	.4	.....
10	.....	.7	.7	.6	1.2	1.1	.4	2.0	.35	.0	.1	.....
11	.....	.7	.7	.6	1.4	1.1	1.7	.5	.4	.0	.0	.....
12	.....	.7	.6	.6	1.4	1.2	.8	.7	.4	.05	.0	.....
13	.....	.7	.6	.6	1.5	1.1	.8	2.0	.4	.1	.0	.....
14	.....	.7	.6	.9	1.4	1.25	.7	2.0	.4	.0	.4	.....
15	.....	.7	.6	.9	1.2	1.3	.9	1.0	.5	.2	.4	.....

Daily gage height, in feet, of Arkansas River near Nepesta, Colo., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	.....	0.7	0.6	0.6	1.0	1.25	0.5	0.7	0.5	0.0	0.5	.....
17	.....	.8	.6	.4	1.0	1.3	.6	.6	.4	.4	.45	.....
18	.....	.8	.6	.8	.8	1.25	.6	1.4	.4	.45	.45	.....
19	.....	.8	.6	.7	.7	1.2	.6	.4	.4	.2	.5	.....
20	.....	.8	.6	.7	1.2	1.05	.6	.5	.9	.3	.75	.....
21	.....	.8	.6	.7	1.3	1.0	.6	.6	.6	.75	.75	.....
22	.....	.7	.6	.95	1.1	1.1	.5	.6	.6	.65	.6	.....
23	.....	.7	.6	.9	1.0	1.1	.4	.6	.5	.75	.5	.....
24	.....	1.0	.7	.9	.9	1.2	.6	.6	.5	.8	.4	.....
25	.....	1.0	.7	.9	1.1	1.2	.6	.6	.35	.75	.0	.....
26	.....	1.0	.6	.9	1.25	1.0	.6	.6	.2	.75	.0	.....
27	0.9	.9	.6	.8	1.1	1.1	.4	.8	.15	.85	.0	.....
28	.9	.8	.7	1.1	1.1	1.0	.4	.6	.0	.95	.0	.....
29	.9	.....	.7	1.1	1.1	1.0	.4	.65	.0	.85	.0	.....
30	.9	.....	.7	1.5	1.1	1.0	.5	.5	.0	.75	.0	.....
31	.8	.....	.7	.....	1.4	.....	.5	.4	.....	.75	.....	.....

ARKANSAS RIVER AT HOLLY, COLO.

This station, which was established October 15, 1907, is located at the pile highway bridge one-half mile southeast of Holly, Colo., about 4 miles above the Colorado-Kansas line.

As no important diversions are made between the two points, the data obtained at this station have special value as showing the amount of surface water passing from Colorado to Kansas.

The station is just above the mouth of Wild Horse Creek and about 1 mile below the mouth of Two Butte Creek. The drainage area is about 25,000 square miles.

As nearly half a million acres of land are under irrigation above this point, most of the ordinary flow of the stream is diverted during the irrigation season, while during the winter months it is used to fill up the numerous storage reservoirs in the basin. Except during periods of heavy flood, the flow at Holly consists chiefly of return waters. The stream flow is little affected by ice.

The gage heights here published have all been referred to the same datum, though a rod gage at a different datum was used during part of 1908. During high stages measurements are made from highway bridge and during low stages by wading at miscellaneous sections.

Fairly good measurements can be taken at this point, but in order to obtain accurate records of daily discharge it is necessary to take them frequently on account of the extremely shifting character of the channel.

Discharge measurements of Arkansas River near Holly, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Jan. 22	Thos. Grieve	.....	274	.....	684
Feb. 28	....do	238	110	2.80	1,050
Apr. 28	C. L. Chatfield	.....	53	1.45	54
30	G. H. Russell	60	27	1.31	32
May 9	....do	30	6.8	1.05	6.6
Aug. 6	G. J. Lyon	.....	1,540	4.55	5,200
Sept. 2	....do	38	9.2	.....	7.5

Daily gage height, in feet, of Arkansas River at Holly, Colo., for 1910.

[S. W. Jones, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	4.05	2.65	1.4	1.3	1.6	1.1	6.35	1.4	1.1	1.1	1.1
2	2.45	4.0	2.35	1.3	1.2	1.6	1.2	3.6	1.3	1.1	1.1	1.1
3	3.95	4.0	2.2	1.3	1.2	1.5	1.0	3.15	1.2	1.1	1.1	1.1
4	6.1	3.8	2.2	1.3	1.2	1.5	1.0	3.1	1.1	1.1	1.1	1.1
5	5.4	3.9	2.1	1.35	1.2	1.8	1.0	3.0	1.1	1.1	1.1	1.1
6	5.65	3.55	2.1	1.3	1.2	1.95	.9	4.2	1.1	1.1	1.1	1.1
7	5.7	3.45	2.0	1.3	1.2	1.75	.9	3.55	1.1	1.1	1.1	1.2
8	5.65	3.3	1.9	1.3	1.2	1.6	.9	3.15	1.1	1.1	1.1	1.3
9	5.35	3.2	1.9	1.3	1.05	1.5	.9	2.65	1.1	1.1	1.1	1.2
10	5.15	3.2	1.8	1.3	1.05	1.5	.9	2.5	1.1	1.1	1.1	1.2
11	5.5	3.1	1.8	1.3	1.05	1.4	.9	2.9	1.1	1.1	1.1	1.2
12	5.45	3.05	1.8	1.55	1.05	1.4	1.0	2.9	1.1	1.1	1.1	1.2
13	5.2	3.0	1.75	1.6	1.05	1.3	2.15	2.35	1.1	1.1	1.1	1.2
14	4.9	2.95	1.7	1.6	1.05	1.3	1.7	2.05	1.1	1.1	1.1	1.2
15	4.35	2.9	1.6	1.85	1.05	1.25	1.5	2.3	1.1	1.1	1.1	1.2
16	5.6	2.8	1.6	2.3	1.05	1.2	1.45	3.05	1.1	1.1	1.1	1.2
17	5.4	2.8	1.6	2.6	1.05	1.0	1.4	2.3	1.1	1.1	1.1	1.2
18	5.45	2.65	1.6	2.45	1.05	.9	1.0	2.0	1.1	1.1	1.1	1.35
19	5.25	2.6	1.5	2.3	1.05	1.0	1.0	2.0	1.1	1.1	1.1	1.4
20	4.8	2.95	1.6	1.95	1.05	1.0	1.0	1.9	1.1	1.1	1.1	1.3
21	4.75	2.75	1.6	1.7	1.05	1.0	1.0	1.8	1.1	1.1	1.1	1.3
22	4.75	2.7	1.5	1.7	1.35	.9	1.0	1.8	1.1	1.1	1.1	1.3
23	4.85	2.8	1.4	1.7	1.6	.9	1.0	1.65	1.1	1.1	1.1	1.3
24	4.75	2.8	1.4	1.6	2.25	.9	1.0	1.45	1.1	1.1	1.1	1.3
25	4.85	2.8	1.4	1.6	2.1	1.0	1.0	1.3	1.1	1.1	1.1	1.3
26	5.05	2.75	1.4	1.5	2.0	1.0	.9	1.3	1.1	1.1	1.1	1.35
27	4.85	3.0	1.4	1.5	2.0	1.0	.9	1.3	1.1	1.1	1.1	1.3
28	4.95	2.85	1.3	1.4	2.0	1.0	.9	1.4	1.1	1.1	1.1	1.35
29	4.55	.....	1.3	1.3	1.95	1.0	.8	1.4	1.1	1.1	1.1	1.3
30	4.45	.....	1.4	1.3	1.7	1.0	.8	1.35	1.1	1.1	1.1	1.3
31	4.25	.....	1.4	.....	1.6	.....	2.1	1.4	.....	1.1	.....	1.3

NOTE.—Gage heights Jan. 1 to Feb. 15 affected by ice.

Daily discharge, in second-feet, of Arkansas River at Holly, Colo., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	838	46	29	100	8	12,000	46	8	8	8
2	.....	550	29	17	100	17	2,480	29	8	8	8
3	.....	437	29	17	69	2	1,560	17	8	8	8
4	.....	437	29	17	69	2	1,470	8	8	8	8
5	.....	369	38	17	186	2	1,310	8	8	8	8
6	.....	369	29	17	272	0	4,140	8	8	8	8
7	.....	304	29	17	162	0	2,360	8	8	8	17
8	.....	241	29	17	100	0	1,560	8	8	8	29
9	.....	241	29	5	69	0	838	8	8	8	17
10	.....	186	29	5	69	0	675	8	8	8	17
11	.....	186	29	5	46	0	1,160	8	8	8	17
12	.....	186	84	5	46	2	1,160	8	8	8	17
13	.....	162	100	5	29	403	549	8	8	8	17
14	.....	139	100	5	29	159	336	8	8	8	17
15	.....	100	214	5	23	69	509	8	8	8	17
16	1,020	100	509	5	17	58	1,390	8	8	8	17
17	1,020	100	780	5	2	46	509	8	8	8	17
18	838	100	632	5	0	2	304	8	8	8	38
19	780	69	509	5	2	2	304	8	8	8	46
20	1,240	100	272	5	2	2	241	8	8	8	29
21	958	100	139	5	2	2	186	8	8	8	29
22	895	69	139	38	0	2	186	8	8	8	29
23	1,020	46	139	100	0	2	120	8	8	8	29
24	1,020	46	100	473	0	2	58	8	8	8	29
25	1,020	46	100	369	2	2	29	8	8	8	29
26	958	46	69	304	2	0	29	8	8	8	38
27	1,310	46	69	302	2	0	29	8	8	8	29
28	1,090	29	46	304	2	0	46	8	8	8	38
29	.....	29	29	272	2	0	46	8	8	8	29
30	.....	46	29	139	2	0	38	8	8	8	29
31	.....	46	.....	100	.....	369	46	.....	8	.....	29

NOTE.—These discharges were obtained from a rating curve which is well defined below 5,500 second-feet.

Monthly discharge of Arkansas River at Holly, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Feb. 16-28	1,310	780	1,010	26,000	B.
March	838	29	186	11,400	B.
April	780	29	147	8,750	B.
May	473	5	84.4	5,190	B.
June	272	0	50.2	2,990	C.
July	403	0	36.5	2,240	C.
August	12,000	29	1,150	70,700	C.
September	46	8	10.3	613	D.
October	8	8	8.0	492	D.
November	8	8	8.0	476	D.
December	46	8	22.5	1,380	D.
The period				130,000	

NOTE.—During the period Jan. 1 to Feb. 15, 1910, the gage heights were distorted by ice to such an extent that no estimates for this period have been made.

TWIN LAKES OUTLET NEAR TWIN LAKES, COLO.

This station was established August 6, 1910, by the State engineer, by whom it is maintained.

A Bristol automatic gage is located at the timber rating flume half a mile below the outlet of Twin Lakes. The flume is of trapezoidal section.

Discharge measurements of Twin Lakes Outlet near Twin Lakes, Colo., in 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
May 5	A. A. Weiland	133	5.13	627
26	Thos. Grieve	125	4.85	548
Aug. 19	A. A. Weiland	37	1.65	76

Daily gage height, in feet, of Twin Lakes Outlet near Twin Lakes, Colo., for 1910.

Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		4.55	16	0.1	0.85
2		4.5	17	.3	.8
3		2.2	18	1.25	1.3
4		.4	19	1.35	.75
5		.35	20	1.5	.7
6	0.15	.3	21	1.2	1.7
7	.1	.2	22	1.25	.75
8	.6	.25	23	.95	1.4
9	.9	.2	24	.8	.8
10	1.2	.2	25	.75	.8
11	1.6	.2	26	.85	1.6
12	1.25	.15	27	.8	
13	1.25	.3	28	.15	
14	1.15	.05	29	1.90	
15	.1	.35	30	3.9	
			31	4.45	

Daily discharge, in second-feet, of Twin Lakes Outlet near Twin Lakes, Colo., for 1910.

Day.	Aug.	Sept.	Day.	Aug.	Sept.
1	.....	487	16	3	28
2	.....	477	17	8	26
3	.....	120	18	49	52
4	.....	11	19	68	24
5	.....	10	20	65	22
6	4	8	21	46	22
7	3	5	22	49	24
8	18	6	23	32	58
9	30	5	24	26	26
10	46	5	25	24	26
11	72	5	26	20	72
12	49	4	27	26	.....
13	49	8	28	4	.....
14	43	2	29	94	.....
15	3	10	30	357	.....
			31	467	.....

NOTE.—These estimates were furnished by the State engineer of Colorado.

Monthly discharge of Twin Lakes Outlet near Twin Lakes, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
Aug. 6–31	467	3	63.7	3,280
Sept. 1–26	487	2	59.3	3,060

CLEAR CREEK NEAR GRANITE, COLO.

This station was established May 27, 1910, by the State engineer and is maintained by him.

A Bristol automatic gage is located at the rectangular concrete rating flume one-fourth mile below the reservoir outlet.

Discharge measurements of Clear Creek near Granite, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 5	A. A. Weiland	20	10.2	[a] 0.62	30.6
22	Thos. Grieve	20	28.5	1.40	22.5
June 12	A. A. Weiland	20	32.2	1.58	27.1

[a] Gage height may be in error.

Daily gage height, in feet, of Clear Creek near Granite, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		1.45	1.45	0.0	0.2	0.2	0.25
2		1.5	1.45	.1	.25	.2	.25
3		1.5	1.35	.25	.25	.15	.25
4		1.55	1.3	.25	.2	.2	.25
5		1.5	1.3	.2	.2	.15	.25
6		1.5	1.2	.0	.2	.25	.25
7		1.55	1.2	.0	.25	.25	.25
8		1.5	1.1	.2	.3	.25	.25
9		1.55	1.0	.3	.3	.2	.2
10		1.5	.85	.3	.3	.2	.2
11		1.5	.75	.3	.3	.2	.25
12		1.5	.7	.3	.25	.2	.25
13		1.5	.65	.3	.25	.25	.2
14		1.5	.65	.2	.3	.25	.2
15		1.5	.65	.0	.25	.25	.25
16		1.5	.6	.0	.3	.2	.2
17		1.5	.6	.0	.3	.2	.2
18		1.5	.6	.05	.25	.2	.25
19		1.5	.55	.25	.25	.2	.25
20		1.5	.6	.2	.2	.2	.2
21		1.5	.6	.2	.2	.25	.2
22		1.5	.65	.2	.2	.25	.2
23		1.5	.55	.2	.2	.25	.2
24		1.45	.45	.2	.3	.2	.2
25		1.45	.45	.2	.3	.2	.2
26		1.4	.4	.25	.35	.2	.2
27	1.35	1.4	.4	.25	.3	.25	.2
28	1.35	1.4	.45	.2	.35	.25	.2
29	1.35	1.4	.5	.2	.3	.25	.2
30	1.35	1.35	.2	.2	.2	.2	.2
31	1.4		.0	.2		.2	

Daily discharge, in second-feet, of Clear Creek near Granite, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		238	238	0	5	5	8
2		250	238	2	8	5	8
3		250	212	8	8	4	8
4		263	200	8	5	5	8
5		250	200	5	5	4	8
6		250	176	0	5	8	8
7		263	176	0	8	8	8
8		250	152	5	11	8	8
9		263	128	11	11	5	5
10		250	96	11	11	5	5
11		250	76	11	11	5	8
12		250	66	11	8	5	8
13		250	57	11	8	8	5
14		250	57	5	11	8	5
15		250	57	0	8	8	8
16		250	48	0	11	5	5
17		250	48	0	11	5	5
18		250	48	1	8	5	8
19		250	40	8	8	5	8
20		250	48	5	5	5	5
21		250	48	5	5	8	5
22		250	57	5	5	8	5
23		250	40	5	5	8	5
24		238	26	5	11	5	5
25		238	26	5	11	5	5
26		225	20	8	16	5	5
27	212	225	20	8	11	8	5
28	212	225	26	5	16	8	5
29	212	225	32	5	11	8	5
30	212	212	5	5	5	5	5
31	225		0	5		5	

NOTE.—These discharges were furnished by the State engineer of Colorado.

Monthly discharge of Clear Creek near Granite, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
May 27-31	225	212	215	2,130
June	263	212	246	14,600
July	238	0	85.8	5,280
August	11	0	5.3	326
September	11	5	8.7	518
October	8	4	6.1	375
November	8	5	6.3	375
The period				23,600

COTTONWOOD CREEK NEAR BUENA VISTA, COLO.

This station, which was established September 23, 1910, is located 7 miles west of Buena Vista, 1½ miles west of Hot Springs Hotel, 1 mile below the junction of South and Middle forks, and 5 miles below the junction with North Fork. It is above all diversions.

The gage is a vertical rod fastened on the left bank 100 feet downstream from the Hot Springs tunnel.

Measurements are made by wading at various sections.

The bed of the stream is rocky with some gravel and fairly permanent.

Discharge measurements of Cottonwood Creek near Buena Vista, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 23	G. H. Russell	22	28	1.33	37
Oct. 24	S. T. Harding	24	21	1.28	33
Nov. 19	G. H. Russell	24	22	1.23	32
Dec. 28	do	20.5	26	1.15	21

Daily gage height, in feet, of Cottonwood Creek near Buena Vista, Colo., for 1910.

[C. A. Mack, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				1.20	16				
2			1.35		17			1.20	
3					18				
4					19			1.23	1.25
5					20		1.30		
6					21				
7					22				
8		1.20			23	1.33			
9					24		1.28		
10					25			1.20	
11			1.30		26		1.30		
12					27				
13					28				1.15
14		1.25		1.25	29				
15					30	1.25			
					31				

CHALK CREEK NEAR BUENA VISTA, COLO.

This station, which was established September 6, 1910, is located near Heywood Hot Springs, about 11 miles southwest of Buena Vista, Colo. It is below all tributaries and above all ditches except two.

A vertical rod gage is located on the right bank about 1,000 feet below the New Heywood Hotel and directly in front of the old hotel.

Measurements are made by wading at various sections.

The bed of the creek is of bowlders and very rough but fairly permanent.

The discharge is affected by ice for about four months each year.

Discharge measurements of Chalk Creek near Buena Vista, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 24	G. H. Russell	26.5	21	0.44	39
Oct. 24	S. T. Harding	25	18	.38	31
Nov. 19	G. H. Russell	22	16	.32	29
Dec. 29	do	19	17	.26	20

Daily gage height, in feet, of Chalk Creek near Buena Vista, Colo., for 1910.

[C. A. Mack and H. C. Hayes, observers.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1					16				
2					17				
3					18				
4					19			0.32	
5		0.40			20			.30	
6	0.45				21				0.35
7					22				
8			0.40		23				
9					24	0.45	0.38		
10					25				
11					26			.30	
12					27				
13	.45		.40		28		.40	.30	.35
14					29	.45			.26
15					30				
					31				

OIL OR FOURMILE CREEK NEAR CANON CITY, COLO.

This station, which was established April 12, 1910, is located 2 miles from Canon City, Colo., on the highway bridge about 200 feet from the main line of the Denver & Rio Grande Railroad.

The station is maintained by the State engineer of Colorado, who furnishes the records to the United States Geological Survey.

High-water measurements are made from the highway bridge and low-water measurements are made by wading at the same section.

A staff gage is attached to a pile on the downstream side of the right abutment of the highway bridge. The datum of the gage has not been changed.

On account of the shifting character of the channel and the absence of data the results at this station have not been entirely satisfactory.

Discharge measurements of Oil or Fourmile Creek near Canon City, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 12	Thos. Grieve	37	9.5	0.65	21.3
Sept 20	....do	26	9.7	.22	27.9
Oct. 31	....do	28	18.8	.10	50.7

NOTE.—Wading at various sections.

Daily gage height, in feet, of Oil or Fourmile Creek near Canon City, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		0.75	0.7	0.3	0.5	0.5	0.5
2		.9	.7	.3	1.0	.4	.5
3		.85	.8	.3	.5	.4	.5
4		.9	.7	.3	1.5	.4	.5
5		.95	.7	.3	1.0	.4	.5
6		.8	.65	.2	1.0	.4	.5
7		.8	.65	.2	1.0	.4	.5
8		.8	.5	.2	1.0	.3	.5
9		.8	.5	.2	1.0	.3	.5
10		.8	.5	.2	1.0	.3	.6
11		.8	.4	.2	1.0	.3	.6
12		.85	.3	.2	1.0	.3	.6
13		.9	.5	.2	1.0	.3	.6
14		.95	.6	.2	.7	.3	.6
15		.9	.45	.25	.7	.3	.6
16		.8	.4	.3	.8	.3	
17	0.8	.75	.4	.2	.8	.3	
18	.9	.75	.4	.3	.7	.7	
19	.9	.7	.4	.3	1.0	.7	
20	.9	.7	.4	.3	.8	.7	
21	.95	.9	.3	.3	.95	.7	
22	.95	.9	.2	.2	.85	.7	
23	1.0	.9	.25	.2	.85	.6	
24	1.0	.95	.2	.2	.85	.6	
25	.85	.85	.35	.3	.8	.6	
26	.85	.75	.3	.3	.8	.7	
27	.75	.9	.3	.3	.75	.7	
28	.85	.8	.3	.4	.5	.6	
29	.85	.8	.3	1.25	.5	.5	
30	.85	.7	.3	1.75	.5	.5	
31		.7		.5	.5		

PURGATORY RIVER DRAINAGE BASIN.

DESCRIPTION.

Purgatory[1] River, the principal tributary of Arkansas River in Colorado, rises in the Culebra Mountains and flows northeastward across the plains for a distance of 165 miles. In the spring the channel carries a moderate volume of water, but as summer approaches the amount is greatly diminished by irrigation and natural conditions until the channel is practically dry. The volume of water contributed to the Arkansas is so small that it has no appreciable effect on the

[1] This stream is often termed Las Animas, especially along its lower course, and sometimes it is called Picket Wire. It is sometimes spelled Purgatoire.

discharge of that river except at times of excessive rainfall, when it may discharge a large volume for a short time.

The drainage basin of Purgatory River is long and narrow. The total area is 3,400 square miles. The 742 square miles lying above Trinidad are mountainous and the surface is much broken by stream channels, which are normally dry. The lower basin is foothill country, merging into rough plains farther east. Drainage lines are well defined throughout part of the area. For 60 miles of its length, commencing 25 miles below Trinidad, Purgatory River flows in a deep canyon. Many small tributary canyons enter at various angles to the main channel.

In the mountainous portion the Weather Bureau records at Clearview for 15 years give a mean annual rainfall of 23 inches; at Trinidad, 10 years' record, 17 inches. The plains drainage has approximately a mean annual precipitation of 12 inches.

No storage is practiced on this stream. No power has been developed, and because of the abundance of coal in the vicinity of Trinidad it is doubtful if power development would be feasible, even under very favorable circumstances.

The basin contains about 100 square miles of merchantable timber land and a small amount of woodland, all of which is included in the Las Animas National Forest.

Some 20,000 acres of land are now being irrigated along Purgatory River.

PURGATORY RIVER AT TRINIDAD, COLO.

This station has been maintained at the Animas Street Bridge, Trinidad, Colo., from May 1, 1896, to July 31, 1899; from August 25, 1905, to December 31, 1905; from November 7, 1906, to March 10, 1907; and from October 14, 1907, to date.

The records furnish information as to flood discharge and are valuable also for irrigation projects.

The South Fork joins the upper Purgatory about 14 miles above Trinidad. Chaquaqua River, the first important tributary below, enters about 60 miles below Trinidad. Considerable water is being diverted for irrigation above the station and some below.

The flow at this point is affected to some extent by ice, though the winter discharge is usually small.

The datum of the present chain gage, which has been used since August 25, 1905, is 1.70 feet below the datum of the old rod gage formerly used. The chain gage is located on the upstream side of the Animas Street Bridge.

Low-water measurements are usually made by wading. Measurements at higher stages are made from the bridge, where conditions are not favorable. The stream bed is shifting in character.

Discharge measurements of Purgatory River at Trinidad, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 26	G. H. Russell	18	10	3.35	9.4
Feb. 8	do	25	25	a3.90	10.7
Mar. 2	do	11	12	a5.10	27
2	do	11	12	a5.10	27
3	do	11	12	a5.10	26.5
18	do	12	14	a5.30	40
Apr. 29	do	56	75	4.70	306
May 25	W. B. Freeman	48	55	4.28	150
June 23	G. H. Russell	32	35	3.81	68
July 26	J. B. Stewart	27	17	3.20	22
Aug. 4	W. B. Freeman	23	27	3.52	48
16	J. B. Stewart	32	18	3.50	33
Oct. 4	G. H. Russell	29	10	3.25	9.7
23	do	32	17	3.50	25.5

a Gage heights distorted by backwater from temporary dam below.

NOTE.—Measurements made at various sections.

Daily gage height, in feet, of Purgatory River at Trinidad, Colo., for 1910.

[H. D. Albertson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.8	3.55	5.35	5.35	4.65	4.5	3.7	3.9	3.7	3.25	3.4	3.35
2	3.85	3.55	5.35	5.35	4.6	4.55	3.7	3.6	3.65	3.25	3.4	3.35
3	3.55	3.5	5.45	5.4	4.45	4.5	3.7	3.5	3.6	3.25	3.4	3.35
4	3.55	3.55	5.4	5.4	4.45	4.5	3.7	3.55	3.5	3.25	3.4	.....
5	3.5	3.7	5.4	5.5	4.55	4.45	3.6	3.7	3.5	3.2	3.4	.....
6	3.45	3.65	5.4	5.35	4.6	4.4	3.5	3.7	3.5	3.2	3.4	.....
7	3.5	3.7	5.35	5.3	4.6	4.45	3.45	3.7	3.5	3.2	3.4	.....
8	3.45	3.7	5.35	5.3	4.55	4.4	3.45	3.7	3.45	3.15	3.4	.....
9	3.5	3.65	5.35	5.3	4.5	4.35	3.35	3.85	3.45	3.15	3.4	.....
10	3.5	3.65	5.35	5.4	4.6	4.3	3.35	4.0	3.45	3.15	3.4	.....
11	3.5	3.7	5.35	5.4	4.6	4.25	3.35	4.2	3.4	3.15	3.4	.....
12	3.55	3.75	5.35	5.4	4.6	4.25	3.95	4.2	3.35	3.1	3.35	.....
13	3.35	3.75	5.35	4.75	4.75	4.2	3.85	3.95	3.45	3.1	3.35	.....
14	3.35	3.75	5.35	4.7	4.95	4.2	3.75	4.35	3.45	3.1	3.35	.....
15	3.5	3.75	5.35	4.5	4.85	4.15	3.55	3.75	3.4	3.1	3.35	.....
16	3.6	3.75	5.4	4.5	4.7	4.15	3.35	4.75	3.65	3.1	3.35	.....
17	3.6	3.6	5.4	4.35	4.7	4.1	3.3	3.35	3.4	3.1	3.35	.....
18	3.55	3.55	5.4	4.3	4.5	4.05	3.2	3.8	3.4	3.1	3.35	.....
19	3.6	3.6	5.4	4.35	4.5	4.05	3.1	3.65	3.45	3.4	3.35	.....
20	3.6	3.55	5.4	4.45	4.45	4.05	3.65	3.4	3.5	3.55	3.35	.....
21	3.6	3.55	5.4	4.65	4.4	4.0	3.95	3.35	3.65	3.5	3.35	.....
22	3.6	3.55	5.45	4.5	4.45	3.9	3.95	3.35	3.5	3.5	3.35	.....
23	3.6	3.6	5.5	4.35	4.5	3.8	3.3	3.7	3.4	3.5	3.35	.....
24	3.5	3.45	5.5	4.35	4.45	3.8	4.85	3.65	3.4	3.5	3.4	.....
25	3.55	3.5	5.5	4.4	4.5	3.8	3.25	3.7	3.4	3.5	3.4	.....
26	3.5	3.5	5.5	4.4	4.45	3.8	3.2	3.7	3.35	3.5	3.4	.....
27	3.55	3.5	5.5	4.45	4.4	3.75	3.15	3.65	3.3	3.5	3.4	.....
28	3.5	3.5	5.4	4.6	4.4	3.7	3.2	3.8	3.25	3.45	3.35	.....
29	3.55	.....	5.4	4.8	4.4	4.1	3.4	3.7	3.2	3.45	3.35	.....
30	3.55	.....	5.35	4.7	4.5	3.75	5.0	3.7	3.2	3.4	3.35	.....
31	3.55	.....	5.3	.....	4.45	.....	5.0	3.7	.....	3.4	.....	.....

NOTE.—Discharge affected by ice at times during January, February, and December. Gage heights Feb. 8–Mar. 18 distorted by construction and removal of cofferdams immediately below the gage.

Daily discharge, in second-feet, of Purgatory River at Trinidad, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	40	280	225	56	115	50	10	20	16
2	40	260	242	56	62	44	10	20	16
3	40	240	225	56	48	39	10	20	16
4	40	240	225	56	55	29	10	20	
5	40	242	240	46	75	29	8	20	
6	40	260	195	35	75	29	8	20	
7	40	260	240	30	70	29	8	20	
8	40	242	195	30	70	24	6	20	
9	40	225	180	23	92	24	6	20	
10	40	260	165	23	120	24	6	20	
11	40	260	154	23	160	20	6	20	
12	40	260	154	107	160	16	4	16	
13	320	320	142	92	100	24	4	16	
14	300	408	142	75	195	24	4	16	
15	225	362	131	47	62	20	4	16	
16	225	300	131	30	338	44	4	16	
17	180	300	120	24	16	20	4	16	
18	165	225	109	16	65	20	4	16	
19	180	225	109	10	44	24	20	16	
20	210	210	109	55	20	29	34	16	
21	280	195	98	129	16	44	29	16	
22	225	210	80	129	16	29	29	16	
23	180	225	65	28	50	20	29	16	
24	180	210	65	460	44	20	29	20	
25	195	225	65	26	50	20	29	20	
26	195	210	65	22	50	16	29	20	
27	210	195	58	16	44	13	29	20	
28	260	195	50	19	65	10	24	16	
29	340	195	120	37	50	8	24	16	
30	300	225	58	515	50	8	20	16	
31		210		515	50		20		

NOTE.—These discharges were obtained as follows: Apr. 1–12, estimated; Apr. 13–June 23 and Aug. 16–Dec. 3, from a rating curve which is fairly well defined; July 1–Aug. 15, indirect method for shifting channels.

Monthly discharge of Purgatory River at Trinidad, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			*a* 10	615	D.
February			*a* 10	555	D.
March			*a* 35	2,150	D.
April			155	9,220	D.
May	408	195	246	15,100	B.
June	242	50	137	8,150	B.
July	515	10	89.9	5,530	C.
August	338	16	78.3	4,810	C.
September	50	8	25.0	1,490	C.
October	34	4	14.9	916	C.
November	20	16	18.0	107	C.
December					
The year				48,600	

a Estimated on account of backwater from construction work below the station.

BIG SANDY CREEK AT HUGO, COLO.

This station, which was established April 10, 1910, is located at the highway bridge half a mile south of Hugo, a town on the Union Pacific Railroad in eastern Colorado.

The gage is a vertical rod attached to highway bridge.

Measurements are made from the bridge to which gage is attached, or, during low stages, by wading at various sections.

The bed is sandy and very shifting. The channel is usually dry during the winter months.

Discharge measurements of Big Sandy Creek at Hugo, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 10	G. H. Russell	35	6.8	2.44	8.5
July 29	C. E. Turner	70	26	2.75	46
30	do	88	44	2.95	88
30	do	68	48	2.98	108
30	do	148	191	4.2	543
31	do	115	45	3.02	108
31	do	130	75	3.4	180
Nov. 27	W. B. Freeman				[a] 0.2

[a] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Big Sandy Creek at Hugo, Colo., for 1910.

[C. E. Turner, observer.]

Day.	Apr.		May.		July.		Aug.		Sept.		Oct.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1							2.8	53				0.5
2			2.5	13			2.55	20		0.5		0.5
3			2.5	13				4				0.5
4			2.4	5				4		0.5		0.5
5							2.55	20		1.0		0.5
6							2.95	80		1.5		0.5
7							2.6	26		1		0.5
8								3		1		0.5
9								2		1		0.5
10	2.45	9						1		1		0.5
11	2.4	5						0.5		1		0.5
12	2.4	5										0.5
13	2.6	26										0.5
14	2.7	39										0.5
15	2.7	39						1				0.5
16	2.7	39						1				0.5
17	2.6	26						0.5		0.5		0.5
18	2.6	26								0.5		0.5
19	2.6	26								0.5		0.5
20	2.5	13								0.5		0.5
21	2.5	13			2.35	25				0.5		0.5
22	2.5	13			2.5	13				0.5		0.5
23	2.4	5								0.5		0.5
24										0.5		0.5
25										0.5		0.5
26										0.5		0.5
27										0.5		0.5
28										0.5		0.5
29					2.55	20				0.5		0.5
30					3.55	236				0.5		0.5
31					3.25	150						0.5

NOTE.—These discharges were obtained from a rating curve which is fairly well defined. Discharges estimated for days when gage was not read. The creek was dry on days between Apr. 24 and Oct. 31 for which no discharges are given.

BIG SANDY CREEK AT KIT CARSON, COLO.

This station, which was established April 15, 1910, is located at the highway bridge 1 mile above Kit Carson and the same distance above the mouth of Wildhorse Creek.

A vertical rod gage is attached to the highway bridge. Measurements are made from the bridge to which gage is attached and by wading at various sections.

The channel is sandy and shifting and is dry during a greater part of the year.

Discharge measurements of Big Sandy Creek at Kit Carson, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 19	G. H. Russell				(a)
June 16	....do				(a)
July 31	H. D. Padgett				(a)
Aug. 5	C. E. Turner	315	216	2.14	430
6	....do	320	223	2.18	454
Nov. 27	W. B. Freeman				(a)

a Dry.

Daily gage height, in feet, of Big Sandy Creek at Kit Carson, Colo., for 1910.

[Cyrus Platner, observer.]

Day.	Apr.	Aug.	Day.	Apr.	Aug.
1		0.95	16	1.40	
2		1.45	17	1.6	
3		1.3	18	1.45	
4		1.15	19	1.4	
5		2.35	20	1.35	
6		2.05	21	1.35	
7		1.5	22	1.35	
8		1.3	23	1.3	
9		1.3	24	1.2	
10		1.25	25	1.0	
11		1.15	26		
12		.95	27		
13			28		
14			29		
15	1.65		30		
			31		

NOTE.—Dry from Apr. 11 to 14, 26 to July 31, Aug. 13 to Dec. 31.

BIG SPRING CREEK NEAR ARENA, COLO.

This station, which was established April 11, 1910, about 2 miles south of Arena and about 7 miles from Kit Carson, stations on the Kansas City & Denver branch of the Union Pacific Railroad, is about 3 miles above the mouth of the creek and is below all tributaries.

The gage is a vertical rod fastened to the left bank. Measurements of discharge are made by wading near the gage.

The channel at moderate stages is crooked and made up of a series of holes and riffles. At high stages the water overflows both banks and spreads over a wide flat valley. The stream bed is of clay and sand.

The gage is at a pool and, therefore, when there is no flow the reading varies owing to evaporation. The gage was read from April 11 to November 5, but as no discharge measurements were made the readings are of little value. From the observer's notes as to dry periods, and estimates of the few observed floods on this stream the flow for the following periods is estimated by C. E. Turner:

June 15 to July 9, no flow.
July 31 to August 1, 100 second-feet, mean for the 2 days.
August 2 to August 18, 7.35 second-feet, mean for the 17 days.
August 19 to September 19, no flow.
September 20 to September 29, 10 second-feet, mean for the 10 days.
September 30 to November 5, no flow.

The total run-off for above periods is 850 acre-feet. The flow for periods April 11 to June 14 and July 9 to 30 have not been estimated, but it is probable if there was any flow it was very small.

Daily gage height, in feet, of Big Spring Creek near Arena, Colo., for 1910.

[W. E. Misner and James Cook, observers.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1.4	1.4	1.2	1.5	1.2	1.4	1.5
2	.....	.....	1.4	1.2	1.45	1.2	1.4	1.5
3	.....	1.4	.....	.....	1.4	1.2	1.4	1.5
4	.....	1.4	1.4	.....	1.4	1.2	1.4	1.5
5	.....	.....	1.4	1.2	1.55	1.2	1.4	1.5
6	.....	1.4	1.4	1.2	2.3	1.2	1.4	.....
7	.....	1.4	1.4	.....	1.3	1.2	1.4	.....
8	.....	1.4	1.4	1.2	1.3	1.2	1.4	.....
9	.....	1.4	1.4	1.2	1.3	1.2	1.4	.....
10	.....	1.4	1.4	1.4	1.3	1.2	1.4	.....
11	1.4	1.4	1.4	1.4	1.3	1.2	1.4	.....
12	1.4	1.4	1.4	1.4	1.25	1.2	1.4	.....
13	1.4	1.4	1.4	.....	1.3	1.2	1.4	.....
14	1.4	1.4	.....	1.4	1.3	1.2	1.5	.....
15	1.4	1.4	1.3	.....	1.3	1.2	1.5	.....
16	1.4	1.4	.....	1.4	1.3	1.2	1.5	.....
17	1.4	.....	1.3	1.4	1.3	1.2	1.5	.....
18	1.4	1.4	.....	.....	1.3	1.2	1.5	.....
19	1.4	1.4	1.3	.....	1.2	1.2	1.5	.....
20	1.4	.....	.....	1.3	1.2	1.3	1.5	.....
21	1.4	1.4	1.3	1.3	1.2	1.3	1.5	.....
22	1.4	1.4	.....	.....	1.2	1.3	1.5	.....
23	1.4	1.4	1.3	1.3	1.2	1.7	1.5	.....
24	1.4	1.4	.....	.....	1.2	1.7	1.5	.....
25	1.4	1.4	1.2	1.3	1.2	1.7	1.5	.....
26	.....	1.4	1.2	1.3	1.2	1.7	1.5	.....
27	1.4	1.4	1.2	.....	1.2	1.7	1.5	.....
28	1.4	1.4	.....	1.3	1.2	1.6	1.5	.....
29	1.4	1.4	.....	.....	1.2	1.5	1.5	.....
30	1.4	1.4	1.2	.....	1.2	1.4	1.5	.....
31	.....	1.4	.....	1.5	1.2	.....	1.5	.....

CANADIAN RIVER DRAINAGE BASIN.

DESCRIPTION.

Canadian River (frequently called Red River in New Mexico) rises in the Cimarron Mountains in Colfax County, N. Mex., flows southward across Mora and San Miguel counties, then turns and flows eastward across northern Texas and through Oklahoma, uniting with Arkansas River about 80 miles above Fort Smith, Ark. The total length of the river from Raton Pass, N. Mex., to the mouth is about 750 miles. Altitudes within the basin range from about 9,000 feet at the head to 460 feet at the mouth. Some of the highest peaks in the Cimarron Range are more than 12,000 feet in elevation.

Cimarron, Mora, and Sapello rivers and Ute Creek, all in New Mexico, are the principal perennial tributaries, but many of the intermittent tributaries, such as the Sweetwater, carry large quantities of flood water. The total drainage area of the river in New Mexico is about 13,000 square miles. The North Fork of the Cimarron (frequently called Beaver Creek at its head) is the most important of the lower tributaries. Its drainage area lies just south of the Cimarron (Dry). Along the headwaters of the Canadian in New Mexico is a considerable area of timberland and woodland, and the drainage area in eastern Oklahoma is also wooded. The remainder of the area in New Mexico, Texas, and Oklahoma consists of dry plains.

The annual precipitation ranges from 20 inches or more in the mountainous sections to 12 inches or less on the plains of New Mexico and Texas; in Oklahoma the range is from 20 inches in the western part to 35 inches near the mouth of the stream. Except along the lower course the run-off is very uncertain and the river bed is frequently dry for long periods; at other times it carries very disastrous floods. The winters along this stream are mild, and the stream flow is rarely affected by ice, except at the higher altitudes.

Many tracts of land are irrigated along the upper Canadian and tributaries, although the aggregate area is only a few thousand acres; the number and acreage of these tracts are, however, rapidly being increased. Good storage sites are afforded by a number of natural lakes and basins, and reservoirs will eventually be constructed on the Cimarron, Vermejo, Ute Creek, Sapello, Mora, and other tributaries, which will provide for the irrigation of hundreds of thousands of acres.

Owing to the intermittent character of the stream, opportunities for water-power development are not very good except on the upper reaches of the mountain streams, but these opportunities will be somewhat increased by storage reservoirs. It may eventually be possible to develop commercially over 25,000 horsepower in New Mexico. At present no important water-power plants are in operation.

CANADIAN RIVER AT LOGAN, N. MEX.

This station, which was reestablished December 22, 1908, for the purpose of determining the amount of water available for storage and irrigation, is located at the Chicago, Rock Island & Pacific Railway bridge, 1 mile south of the depot at Logan, N. Mex. It is near the location of the bridge and gage used by the United States Reclamation Service from June 29, 1904, to February 26, 1905, which were washed out by flood, but the present gage has no determined relation to that gage.

The station is about 5 miles below the mouth of Ute Creek and 3 miles above the mouth of Arroyo Largo. The drainage area is about 12,000 square miles.

The stream flow is not affected by ice and very little by artificial control above. The extremely shifting nature of the stream bed makes it necessary to obtain a large number of discharge measurements in order to obtain the best results. It is usually difficult to make discharge measurements at higher stages on account of the sudden rise and equally rapid subsidence of the river during floods. High-water measurements must be made by floats, because of a large amount of drift in the river. Low-water measurements are made by wading, and those at ordinary stages from a cable 450 feet upstream from the railroad bridge, which is 140 feet high.

Numerous rod gages, secured to old piling under the bridge, were used during 1909, but all gage readings have been referred to the datum of the two railroad gages, which are at the same datum and are painted on the third concrete pier from each bank. On August 5, 1910, a Friez automatic gage was installed about three-fourths of a mile above the old gage. The datum of the Friez gage bears no relation to that of the rod gage.

Discharge measurements of Canadian River at Logan, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Jan. 31	G. H. Russell	81	77	3.45	107
Mar. 15	do	86	113	.....	134
May 7	J. B. Stewart	115	144	4.28	323
June 18	do	275	239	4.10	612
18	do	249	227	3.98	540
Aug. 24	W. W. Mills	137	111	.....	230
Oct. 14	G. H. Russell	8	2.5	[a] 3.75	1.8
Dec. 21	W. B. Freeman	.....	.....	[a] 3.8	[b] 5

[a] From automatic gage. [b] Estimated.

Daily gage height, in feet, of Canadian River at Logan, N. Mex., for 1910.

[I. F. Romine, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.35	3.25	3.05	.....	4.1	3.8	2.6	.....	.....	4.5	4.1	3.8
2	4.95	3.25	3.05	3.4	4.4	3.8	3.3	.....	.....	4.6	4.1	3.8
3	5.25	3.25	3.05	3.7	4.4	3.95	4.0	.....	6.45	4.5	4.0	3.8
4	5.35	3.25	3.05	3.8	4.4	4.15	3.05	.....	6.45	4.2	4.0	3.8
5	5.25	3.25	3.1	3.8	4.4	4.5	2.9	.....	6.35	4.1	4.0	3.8
6	5.05	3.25	3.1	3.8	4.4	4.8	2.9	7.2	6.25	4.0	4.0	3.8
7	5.05	3.15	3.1	3.8	4.3	4.2	2.9	7.4	6.1	3.8	4.0	3.8
8	5.05	3.15	3.15	3.8	3.9	3.8	3.3	7.15	6.0	3.8	4.0	3.8
9	4.95	3.20	3.15	2.9	3.6	3.7	4.2	7.3	5.9	3.8	4.0	3.8
10	4.95	3.2	3.2	2.9	3.6	3.6	4.85	8.3	5.8	3.75	4.0	3.8
11	5.05	3.25	3.25	2.9	3.6	3.4	4.0	7.6	5.7	3.85	4.0	3.8
12	5.05	3.25	3.25	3.6	3.5	3.4	3.8	8.15	5.6	3.85	4.0	3.8
13	5.05	3.25	3.35	3.6	3.6	3.1	3.5	7.15	5.6	3.8	4.0	3.8
14	5.1	3.25	3.45	3.6	3.8	3.0	3.5	9.5	5.6	3.75	4.0	3.8
15	5.25	3.35	.....	3.6	3.6	6.8	3.35	8.9	5.6	3.8	4.0	3.8
16	5.25	3.35	.....	3.6	3.5	7.6	2.4	7.6	5.65	3.8	4.0	3.8
17	5.05	3.35	.....	3.4	3.7	4.1	3.15	6.9	.....	3.8	4.0	3.8
18	5.05	3.35	.....	3.4	3.9	3.8	2.9	9.5	.....	3.8	4.0	3.8
19	5.15	3.25	.....	3.4	3.6	3.8	2.9	7.7	.....	3.8	4.0	3.8
20	5.15	3.25	.....	3.6	3.5	3.7	2.8	.....	.....	3.8	4.0	3.8
21	5.05	3.2	.....	3.6	3.5	3.05	2.6	.....	.....	3.8	4.0	3.8
22	4.95	3.15	.....	3.9	3.5	2.9	2.2	.....	.....	3.8	4.0	3.8
23	4.95	3.1	.....	3.9	3.4	2.55	1.9	.....	.....	3.75	4.0	3.8
24	4.95	3.1	.....	3.9	3.4	2.5	1.9	.....	3.9	3.75	4.0	3.8
25	4.65	3.1	.....	4.0	3.3	2.5	3.0	.....	3.9	3.75	4.0	3.8
26	4.45	3.05	.....	4.0	3.3	2.65	2.9	.....	3.8	3.8	3.9	3.8
27	4.2	3.05	.....	3.9	3.3	2.8	2.8	.....	3.8	3.9	3.8	3.8
28	4.05	3.05	.....	4.0	3.3	2.8	2.35	.....	3.8	4.1	3.8	3.8
29	3.85	.....	.....	3.85	3.3	2.9	2.9	.....	5.2	4.2	3.8	3.8
30	3.75	.....	.....	3.85	3.55	2.65	2.9	.....	4.9	4.2	3.8	3.8
31	3.3	.....	.....	.....	3.65	.....	6.0	.....	.....	4.2	.....	3.8

NOTE.—Gage out Mar. 15–Apr. 2 and June 15–17. Gage heights recorded from railroad gage June 15–17. Gage heights after July 31 were taken on automatic gage and are not comparable with those previous to that date.

Daily discharge, in second-feet, of Canadian River at Logan, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	352	76	48	100	260	178	80
2	805	76	48	100	375	178	220
3	1,180	76	48	155	375	216	540
4	1,340	76	48	178	375	278	160
5	1,180	76	55	178	375	425	130
6	920	76	55	178	375	650	130
7	920	62	55	178	330	295	130
8	920	62	62	178	202	178	220
9	805	69	62	32	135	155	710
10	805	69	69	32	135	135	1,640
11	920	76	76	32	135	100	540
12	920	76	76	135	116	100	410
13	920	76	92	135	135	55	280
14	980	76	108	135	178	42	280
15	1,180	92	.....	135	135	6,550	235
16	1,180	92	.....	135	116	10,800	53
17	920	92	.....	100	155	620	185
18	920	92	.....	100	202	424	130
19	1,040	76	.....	100	135	420	130
20	1,040	76	.....	135	116	370	110
21	920	69	.....	135	116	300	80
22	805	62	.....	202	116	130	30
23	805	55	.....	202	100	75	10
24	805	55	.....	202	100	65	10
25	525	55	.....	230	84	65	150
26	400	48	.....	230	84	90	130
27	295	48	.....	202	84	115	110
28	245	48	.....	230	84	115	47
29	190	.....	.....	190	84	130	130
30	166	.....	.....	190	126	90	130
31	84	.....	.....	.....	145	.....	3,400

NOTE.—These discharges are based on a rating curve which is well defined.

Monthly discharge of Canadian River at Logan, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,340	84	790	48,600	A.
February	92	48	70.8	3,930	A.
Mar. 1–14	108	48	64.4	1,790	A.
April	230	32	149	8,870	A.
May	375	84	177	10,900	A.
June	10,800	42	778	46,300	B.
July	3,400	10	340	20,900	C.
The period				141,000	

NOTE.—Sufficient measurements, referred to the Friez gage, have not been obtained to make estimates after July.

CHICO RICO CREEK NEAR RATON, N. MEX.

This station, which was established July 29, 1910, is located on the St. Louis, Rocky Mountain & Pacific Railway bridge, 10 miles southeast of Raton, N. Mex.

A Friez automatic gage is secured to the bridge, and measurements are made by wading at low stages and from the bridge at high stages.

Discharge measurements of Chico Rico Creek near Raton, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 26	W. W. Mills	8.8	4.4	1.60	1.6
Oct. 7	G. H. Russell	1.6	.36	1.54	.4

Daily gage height, in feet, of Chico Rico River near Raton, N. Mex., for 1910.

[Jay Walrath, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.4	1.65	1.55	1.6	1.6	16	.....	1.6	1.55	1.5	1.6	1.6
2	.....	2.0	1.65	1.55	1.6	1.6	17	.....	1.6	1.55	1.5	1.6	1.6
3	.....	1.5	1.6	1.55	1.6	1.6	18	.....	1.6	1.6	1.5	1.6	1.6
4	.....	2.4	1.6	1.55	1.6	1.6	19	.....	1.6	1.6	1.5	1.6	1.6
5	.....	2.7	1.6	1.55	1.6	1.6	20	.....	1.6	1.6	1.5	1.6	1.6
6	.....	1.9	1.6	1.55	1.6	1.6	21	.....	1.6	1.6	1.5	1.6	1.6
7	.....	1.85	1.6	1.55	1.6	1.6	22	.....	1.6	1.6	1.55	1.6	1.6
8	.....	1.8	1.6	1.55	1.6	1.6	23	.....	1.7	1.6	1.55	1.6	1.6
9	.....	1.8	1.6	1.55	1.6	1.6	24	.....	1.65	1.6	1.55	1.6	1.6
10	.....	1.8	1.6	1.55	1.6	1.6	25	.....	1.65	1.6	1.55	1.6	1.6
11	.....	1.9	1.6	1.55	1.6	1.6	26	.....	1.65	1.6	1.55	1.6	1.6
12	.....	2.0	1.6	1.55	1.6	1.6	27	.....	1.6	1.6	1.55	1.6	1.6
13	.....	1.85	1.6	1.55	1.6	1.6	28	.....	1.65	1.6	1.55	1.6	1.6
14	.....	2.0	1.6	1.55	1.6	1.6	29	.....	1.65	1.6	1.6	1.6	1.6
15	.....	1.7	1.55	1.55	1.6	1.6	30	1.6	1.6	1.6	1.6	1.6	1.6
							31	1.5	1.6	.....	1.6	.....	1.6

UNA DEL GATÓ CREEK NEAR RATON, N. MEX.

This station was established May 3, 1910, at a point three-fourths of a mile above the St. Louis, Rocky Mountain & Pacific Railway bridge, 2 miles above A. J. Meloche's ranch and 18 miles east of Raton, N. Mex.

A Friez automatic gage is attached to a tree on the left bank. Measurements are made by wading.

Discharge measurements of Una del Gato Creek near Raton, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 3	J. B. Stewart	9.4	2.2	0.90	2.0
Aug. 26	W. W. Mills		1.4	.8	.3
Oct. 8	G. H. Russell			.75	a.3

a Estimated.

Daily gage height, in feet, of Una del Gato Creek near Raton, N. Mex., for 1910.

[A. J. Meloche and W. J. Butt, observers.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		0.85	0.95	0.8	0.8	0.75	0.8
2		.85	1.0	.8	.8	.8	.8
3	0.9	.85	1.0	.95	.8	.8	.8
4	.9	.9	1.0	.95	.8	.8	.8
5	.9	.85	1.0	.9	.8	.8	.8
6	.85	.85	1.0	.8	.8	.8	.8
7	.8	.85	1.0	.8	.8	.8	.8
8	.8	.85	1.0	.8	.8	.8	.8
9	.8	.85	1.0	.8	.8	.8	.8
10	.8	.85	1.0	1.05	.8	.8	.8
11	.75	.85	1.0	.95	.8	.8	.8
12	.75	.8	1.0	1.0	.8	.8	.8
13	.8	.8	1.0	.8	.8	.8	.8
14	.75	.8	1.0	1.1	.8	.8	.8
15	.7	.8	1.0	.95	.8	.8	.8
16	.7	.8	1.0	.9	.8	.8	.8
17	.7	.8	.9	.8	.8	.8	.8
18	.7	.8	.9	.8	1.0	.8	.8
19	.7	.85	.9	.8	.8	.8	.8
20	.7	.85	.9	.8	.75	.8	.85
21	.75	.85	.9	.8	.75	.85	.9
22	1.05	.85	.9	.8	.8	.8	.9
23	1.1	.9	.9	.8	.75	.8	.9
24	1.15	.95	.9	.85	.75	.8	.9
25	1.15	.95	.9	.8	.75	.8	.9
26	1.1	.95	.85	.8	.75	.8	.8
27	1.05	.95	.85	.75	.75	.75	.85
28	1.05	.95	.85	.8	.75	.75	.8
29	.95	.95	1.0	.8	.75	.8	.8
30	.9	.95	.8	.8	.75	.8	.8
31	.85		.8	.8		.8	

NOTE.—The stream was frozen during December.

CIMARRON RIVER AT UTE PARK, N. MEX.

This station, which was established July 14, 1907, to determine the amount of water available for storage and irrigation, is located at the highway bridge 300 feet north of the railway station at Ute Park, N. Mex., the terminus of the St. Louis, Rocky Mountain & Pacific Railway. It has been maintained in cooperation with the Territorial engineer of New Mexico.

The station is one-half mile below the mouth of Ute Creek and is below most of the mountain tributaries except the Rayado, which enters several miles below. The drainage area above the station is over 200 square miles.

Very little water is diverted above this point, but most of the normal flow of the stream is used for irrigation in the valley below.

The Eagles Nest reservoir site, which has a capacity of over 100,000 acre-feet, is situated in the canyon a few miles upstream from this station and is capable of storing the entire run-off.

Ice is found on this stream during the winter months, but usually has very little effect on the open-channel flow.

The datum of the rod gage has remained constant since the station was established. In September, 1909, a Friez automatic gage was installed at the same location and datum. High-water measurements are made at the bridge and low-water measurements by wading. The stream bed is fairly permanent, but it is rather rough, making high-water measurements somewhat inaccurate. Results, however, should be very good.

Discharge measurements of Cimarron River at Ute Park, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 27	G. H. Russell	16.5	23.2	0.48	23.2
27	....do	16.5	23.2	.45	22.4
Mar. 5	....do	19	34	.60	44.0
May 4	J. B. Stewart	31	41	.98	136
June 14	....do	22.5	15	.47	17.0
July 27	....do	15.5	7.6	.20	3.9
Aug. 28	W. W. Mills	19.1	9.0	.35	8.2
28	....do	20.5	15.1	.35	8.3
Oct. 3	G. H. Russell	12	9.5	.30	4.4

Daily gage height, in feet, of Cimarron River at Ute Park, N. Mex., for 1910.

[Mrs. R. P. Woodward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.45	0.4	0.4	0.85	.....	0.55	0.35	0.2	0.4	0.25	0.4	0.3
2	.8	.35	.4	.8	.....	.5	.3	.2	.35	.25	.4	.4
3	.6	.35	.55	.7	.....	.5	.3	.3	.35	.25	.4	.55
4	.55	.35	.6	.7	.10	.5	.3	.35	.35	.25	.4	.45
5	.55	.35	.7	.65	.95	.45	.3	.4	.35	.2	.4	.15
6	.55	.4	1.0	.7	.9	.45	.25	.35	.35	.25	.4	.15
7	.55	.4	1.05	.7	.85	.4	.25	.3	.35	.25	.4	.15
8	.55	.35	1.0	.7	.8	.4	.25	.3	.35	.25	.35	.2
9	.55	.35	.85	.8	.75	.35	.25	.35	.35	.3	.35	.25
10	.55	.35	.75	.8	.75	.35	.25	.35	.35	.3	.35	.35
11	.55	.35	.8	.9	.75	.35	.35	.4	.3	.3	.4	.35
12	.55	.35	.7	.85	.75	.3	.35	.45	.3	.3	.35	.35
13	.55	.35	.75	.9	.75	.3	.4	.4	.3	.3	.5	.3
14	.55	.4	.75	.....	.75	.5	.35	.45	.3	.3	.5	.3
15	.4	.35	.7	.....	.8	.55	.35	.4	.35	.3	.45	.3
16	.4	.25	.7	.85	.....	.5	.35	.4	.4	.3	.55	.35
17	.4	.25	.7	.9	.....	.45	.35	.4	.35	.35	.45	.3
18	.35	.25	.75	.95	.....	.45	.35	.4	.35	.4	.45	.3
19	.4	.3	.8	1.0	.....	.4	.35	.4	.35	.45	.4	.3
20	.4	.3	.85	1.05	.....	.4	.35	.4	.35	.45	.4	.3
21	.4	.3	.85	1.05	.....	.4	.35	.4	.35	.4	.35	.3
22	.4	.3	.9	1.05	.....	.35	.3	.4	.35	.4	.4	.3
23	.4	.35	.9	1.05	.....	.35	.25	.45	.35	.45	.35	.3
24	.4	.45	.95	1.0	.....	.35	.3	.45	.3	.4	.4	.35
25	.4	.45	.9	1.15	.....	.4	.3	.4	.3	.4	.4	.35
26	.35	.35	.9	1.15	.....	.4	.3	.4	.3	.4	.4	.35
27	.35	.35	.85	1.15	.....	.4	.2	.35	.25	.4	.35	.35
28	.4	.35	.9	1.15	.....	.4	.15	.35	.25	.4	.35	.35
29	.4	.....	.8	1.30	.5	.4	.15	.35	.3	.4	.25	.35
30	.4	.....	.85	1.20	.55	.35	.25	.35	.3	.4	.25	.35
31	.4	.....	.85	.....	.55	.....	.25	.4	.....	.4	.....	.35

NOTE.—Affected by ice Jan. 1–14 and Dec. 17–31.

Daily discharge, in second-feet, of Cimarron River at Ute Park, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	16	16	16	101	.....	31	8.4	3.3	11	4.6	11	5.8
2	16	13	16	88	.....	25	5.8	3.3	8.4	4.6	11	11
3	16	13	36	64	.....	25	5.8	5.8	8.4	4.6	11	26
4	16	13	44	64	125	25	5.8	8.4	8.4	4.6	11	16
5	16	13	64	54	112	20	5.8	11	8.4	3.3	11	2.8
6	16	16	141	64	100	20	4.6	8.4	8.4	4.6	11	2.8
7	16	16	154	64	87	15	4.6	5.8	8.4	4.6	11	2.8
8	16	13	141	64	75	16	4.6	5.8	8.4	4.6	8.4	3.3
9	16	13	101	88	65	12	4.6	8.4	8.4	5.8	8.4	4.6
10	16	13	76	88	65	12	4.6	8.4	8.4	5.8	8.4	8.4
11	16	13	88	114	65	12	8.4	11	5.8	5.8	11	8.4
12	16	13	64	101	66	9.5	8.4	16	5.8	5.8	8.4	8.4
13	16	13	76	114	66	10	11	11	8.4	5.8	20	5.8
14	16	16	76	110	66	27	8.4	16	5.8	5.8	20	5.8
15	16	13	64	106	78	26	8.4	11	8.4	5.8	16	5.8
16	16	8	64	101	.....	20	8.4	11	11	5.8	26	8.4
17	16	8	64	114	.....	16	8.4	11	8.4	8.4	16	8
18	13	8	76	128	.....	16	8.4	11	8.4	11	16	8
19	16	10	88	141	.....	11	8.4	11	8.4	16	11	8
20	16	10	101	154	.....	11	8.4	11	8.4	16	11	8
21	16	10	101	154	.....	11	8.4	11	8.4	11	8.4	8
22	16	10	114	154	.....	8.4	5.8	11	8.4	11	11	8
23	16	13	114	154	.....	8.4	4.6	16	8.4	16	8.4	8
24	16	22	128	141	.....	8.4	5.8	16	5.8	11	11	8
25	16	22	114	182	.....	11	5.8	11	5.8	11	11	8
26	13	13	114	182	.....	11	5.8	11	5.8	11	11	8
27	13	13	101	182	.....	11	3.3	8.4	4.6	11	8.4	8
28	16	13	114	182	.....	11	2.8	8.4	4.6	11	8.4	8
29	16	.....	88	226	24	11	2.8	8.4	5.8	11	4.6	8
30	16	.....	101	197	31	8.4	4.6	8.4	5.8	11	4.6	8
31	16	.....	101	.....	31	.....	4.6	11	.....	11	.....	8

NOTE.—These discharges were obtained as follows: Jan. 1–14, estimated on account of ice conditions; Jan. 15–May 4, from a rating curve which is fairly well defined; May 5–June 14, indirect method for shifting channels; June 15–Dec. 17, from a rating curve which is fairly well defined; Dec. 17–31, estimated on account of ice conditions.

Monthly discharge of Cimarron River at Ute Park, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	16	13	15.7	965	D.
February	16	8	13.1	728	B.
March	154	16	88.4	5,440	B.
April	226	54	122	7,260	A.
May	125	24	70.4	2,100	B.
June	31	8.4	15.3	910	C.
July	11	2.8	6.30	387	B.
August	16	3.3	9.97	613	B.
September	11	4.6	7.63	454	B.
October	16	3.3	8.36	514	B.
November	26	4.6	11.5	684	B.
December	26	2.8	7.94	488	B.
The period	.....	.....	.....	20,500	

RAYADO RIVER AT ABREU'S RANCH, NEAR CIMARRON, N. MEX.

This station, which was established during the first part of 1908 as a temporary station by the New Mexico Hydrographic Survey to determine the amount of water available for irrigation, is located three-fourths of a mile upstream from Abreu's ranch, which is 20 miles west of Springer and 12 miles southwest of Cimarron, the two nearest railroad points. Daily gage readings were taken during 1909

by the Territorial survey. In October, 1909, when the United States Geological Survey abandoned the station on the Rayado at Miami ranch, near Springer, it took over the station at Abreu's ranch.

The station is now maintained in cooperation with the Territorial engineer of New Mexico.

The river receives no tributaries for several miles above or below the station, and the station is above all irrigation diversions.

The datum and location of the gage has remained constant during the maintenance of the station. On November 27, 1909, a chain gage was installed at the same location and datum as the rod gage.

Measurements of discharge are made by wading in the vicinity of the gage or from a foot log about 100 yards upstream. Fair results should be obtained. Thin ice is sometimes found at the station during the winter months.

Discharge measurements of Rayado River at Abreu's ranch, near Cimarron, N. Mex., in 1908 and 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17	R. L. Cooper	23	9.7	1.30	7.8
19	....do	23	9.2	1.30	7.3
24	....do	23	8.0	1.25	5.1
26	....do	23	9.8	1.30	7.4
29	....do	31	29.1	2.20	[a] 103
Aug. 10	....do	22.5	11.7	1.25	6.1
Oct. 31	....do	21	7.3	1.15	3.0
1910.					
Jan. 28	G. H. Russell	13	13	1.32	13
Mar. 4	....do	13	8	1.35	7.8
4	....do	13	8	1.35	7.7
May 4	J. B. Stewart	14.8	18.8	1.78	49
June 14	....do	13	8.4	1.35	8.3
27	....do	12.5	5.0	1.25	3.6
Aug. 29	W. W. Mills	16.6	5.0	1.25	3.0

[a] Measured at Abreu's footbridge; 19.8 second-feet were being diverted between the gage and the point of measurement, making a total discharge of 123 second-feet past the gage.

NOTE.—The measurements for 1908 published here were inadvertently omitted from Water-Supply Paper 247.

Daily gage height, in feet, of Rayado River at Abreu's ranch, near Cimarron, N. Mex., for 1910.

(Robert Parker, observer.)

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.
1	1.40	1.32	1.15	.....	.....	.....	1.4
2	1.38	1.32	1.2	.....	.....	1.25	.....
3	1.28	1.35	1.35	.....	.....	1.2	1.3
4	1.29	1.33	1.25	1.8	.....	.....	1.35
5	1.30	1.33	1.0	1.7	.....	.....	.....
6	1.29	1.15	1.4	1.7	.....	1.2	1.3
7	1.29	1.20	1.1	1.45	.....	.....	.....
8	1.29	1.28	1.3	1.45	.....	1.2	1.3
9	1.40	1.16	1.3	1.4	.....	.....	.....
10	1.42	1.30	1.5	1.4	.....	1.2	1.7
11	1.60	1.20	1.35	1.5	.....	.....	1.45
12	1.62	1.21	1.45	1.45	.....	1.25	.....
13	1.32	1.30	1.55	1.25	.....	.....	1.3
14	1.34	1.25	1.55	1.2	1.35	1.25	.....
15	1.34	1.16	1.45	1.2	.....	.....	1.3

Daily gage height, in feet, of Rayado River at Abreu's ranch, near Cimarron, N. Mex., for 1910—Continued.

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.
16	1.35	1.17	1.55	1.1	1.35	1.2	.....
17	1.28	1.12	1.6	1.1	.....	1.2	1.25
18	1.35	1.13	1.6	.85	1.35	.....	.....
19	1.35	1.10	.....	.9	.....	.....	.....
20	1.43	1.15	.....	.9	1.3	1.3	1.25
21	1.30	1.19	.....	.9	.....	.....	1.25
22	1.37	1.09	.....	.7	1.3	1.3	.....
23	1.33	.....	.....	.65	.....	.....	1.25
24	1.36	.....	.....	.....	1.3	1.35	.....
25	1.36	.....	.....	.....	.....	.....	.....
26	1.38	.....	.....	.....	1.25	1.3	.....
27	1.38	.....	.....	.....	.....	.....	.....
28	1.32	.....	.....	.....	1.2	.....	.....
29	1.35	.....	.....	.....	.....	1.3	.....
30	1.30	.....	.....	.....	1.3	1.3	.....
31	1.25	.....	.....	.....	.....	.....	.....

NOTE.—Gage heights for January and February somewhat affected by ice.

Daily discharge, in second-feet, of Rayado River at Abreu's ranch, near Cimarron, N. Mex., for 1910.

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.
1	12	13	1.0	.....	.....	4.2	11
2	11	13	1.7	.....	.....	3.3	8
3	10	15	8	.....	.....	1.7	5
4	10	14	3.3	52	.....	1.7	8
5	10	14	0	39	.....	1.7	6.5
6	10	4	11	39	.....	1.7	5
7	10	6	4	14	.....	1.7	5
8	10	10	5	14	.....	1.7	5
9	10	4	5	11	.....	1.7	22
10	10	12	18	11	.....	1.7	39
11	10	6	8	18	.....	2.5	16
12	10	6	15	14	.....	3.3	10
13	13	12	23	3.3	.....	3.3	5
14	14	9	23	1.7	8	3.3	5
15	14	4	16	1.7	8	2.5	5
16	15	4	23	.4	8	1.7	4.2
17	10	3	28	.4	8	1.7	3.3
18	15	3	28	0	8	1.7	3.3
19	15	2	.....	0	6.5	5	3.3
20	15	3	.....	0	5	5	3.3
21	12	5	.....	0	5	5	3.3
22	14	2	.....	0	5	5	3.3
23	14	.....	.....	0	5	6.5	3.3
24	14	.....	.....	.....	5	8	3
25	14	.....	.....	.....	4.2	6.5	3
26	14	.....	.....	.....	3.3	5	3
27	14	.....	.....	.....	2.5	5	3
28	13	.....	.....	.....	1.7	5	3
29	15	.....	.....	.....	3.4	5	3
30	12	.....	.....	.....	5	5	3
31	9	.....	.....	.....	.....	5	3

NOTE.—These discharges were obtained as follows: Jan. 1–Feb. 22, estimated on the basis of one measurement made during the period. Apr. 1–May 17 and June 14–Aug. 31, from a rating curve which is well defined. May 18–22, estimated. Discharges for days when gage was not read, interpolated.

Monthly discharge of Rayado River at Abreu's ranch, near Cimarron, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	12.2	750	D.
Feb. 1–22	.....	.....	7.5	327	D.
Apr. 1–18	28	0	12.1	430	B.
May 4–23	52	0	11.0	490	C.
June 14–30	8	1.7	5.38	182	C.
July	8	1.7	3.61	222	C.
August	39	3	6.68	411	C.

MORA RIVER AND LA CUEVA CANAL AT LA CUEVA, N. MEX.

This station, which was established August 25, 1903, primarily to determine the amount of water available for storage, is located at the wagon bridge at La Cueva, N. Mex., in the Mora land grant, 26 miles north of Las Vegas, N. Mex. Since July, 1907, the records have been obtained in cooperation with the Territorial engineer of New Mexico.

The station is a few miles above the mouth of the Cebolla and a short distance downstream from the intake of La Cueva Canal, and just below the canal wasteway. This canal carries water for irrigation, and during the nonirrigating season it is used as a feeder for a reservoir below.

The canal rod gage is located at a footbridge below the wasteway, just north of the gaging station on the river. The datum of the canal gage has remained constant, and gage readings have been taken continuously since the station was established whenever there was any water in the canal. Apparent discrepancies in the gagings of the canal are accounted for by the fact that the bed of the canal occasionally contains a considerable deposit of silt, which is cleaned out at intervals.

A little water is diverted above the station for irrigation in addition to that taken out by La Cueva canal, and considerable land is irrigated below the station. By developing the available storage at reservoir sites in that locality it will be possible to utilize the entire flow of the stream for irrigation.

The original gage was washed out in the flood of September 29, 1904, and was replaced by another at practically the same section on April 29, 1905. The datum of this staff gage, which is still in use, is 1.32 feet above that of the original gage.

Fair measurements can be made by wading at low stages; high-water measurements must be corrected for the skew of the bridge. The channel is subjected to some shifting, but fair results should be obtained by making frequent measurements at the higher stages.

Discharge measurements of Mora River at La Cueva, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
Feb. 6[a]	G. H. Russell	15.5	14.6	1.00	17
Mar. 7	Russell and Strong	19	14.7	1.02	20.3
7	do	19	14.7	1.02	20.5
Apr. 26	J. B. Stewart	33.5	40	1.80	115
June 12	do	10.5	3.5	.62	5.3
Aug. 12	do	18	8.3	1.15	23.5
30	W. W. Mills	14.6	4.6	.70	3.8
Oct. 21	G. H. Russell	16	7.3	.91	8.75
Nov. 30	C. B. Digby	16	5.6	.60	1.85

[a] Ice along edges of stream.

Daily gage height, in feet, of Mora River at La Cueva, N. Mex., for 1910.

[Hugh Loudon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.9	0.8	1.05	1.8	1.2	0.6	1.4	0.55	0.65	0.9	0.9
2	.....	.9	.8	1.0	1.7	1.0	.6	1.1	.55	.7	.9	.9
3	.....	1.1	.85	1.0	1.7	1.0	.6	.9	.6	.85	.95	.6
4	.....	.....	.9	.95	1.6	1.05	.6	1.85	.6	.6	.9	.5
5	.....	.....	1.0	.9	1.6	1.0	.55	1.3	.6	.85	.95	.7
6	.....	1.0	1.0	.9	1.5	1.0	.6	1.0	.55	.65	.95	.55
7	.....	.....	1.0	.85	1.5	1.0	.55	1.0	.6	.75	.95	.55
8	.....	.....	1.0	.9	1.45	.8	.55	1.0	.6	.7	.9	.55
9	.....	.95	1.0	.9	1.4	.7	.5	.9	.6	.6	.6	.6
10	.....	1.0	1.0	1.15	1.5	.65	.55	1.0	.6	.75	.6	.9
11	.....	.95	1.0	1.15	1.4	.6	.5	1.0	.6	.8	.6	.55
12	.....	1.1	1.0	1.25	1.4	.6	.5	1.15	.6	.5	.6	.55
13	.....	1.0	1.1	1.6	1.5	.65	.65	1.1	.55	.8	.6	.9
14	0.95	.85	1.0	1.6	1.5	.7	.5	1.0	.85	.85	.6	.9
15	.95	.75	1.0	1.6	1.5	1.2	.5	1.0	.9	.85	.9	.5
16	1.0	1.0	1.0	1.5	1.4	.95	.5	.95	.9	.5	.7	.6
17	1.0	.....	1.0	1.6	1.4	.85	.5	1.2	.65	.9	.65	.8
18	1.05	.....	1.0	1.6	1.35	.75	.5	1.2	.65	.8	.9	.5
19	1.0	.....	.95	1.6	1.35	.75	.5	1.2	.65	.7	.85	.5
20	1.0	.....	1.15	1.75	1.25	.7	.5	.95	.6	.65	.7	.....
21	1.1	.95	1.05	1.8	1.25	.75	.5	1.0	.6	.6	.9	.....
22	1.0	.95	1.0	1.8	1.3	.7	.5	1.0	.9	.7	.7	.....
23	1.0	.9	1.1	1.8	1.3	.6	.5	1.0	.7	.7	.6	.....
24	1.0	.85	1.15	1.8	1.1	.6	.5	.8	.6	.7	.6	.....
25	1.0	.....	1.2	1.7	1.1	.6	.6	.7	.8	.6	.9	.....
26	1.1	.9	1.2	1.8	1.1	.95	.5	.7	.85	.9	.65	.....
27	1.1	.9	1.15	1.85	1.0	.95	.45	.7	.85	.9	.55	.....
28	1.2	.9	1.0	1.9	1.05	1.0	.45	.7	.9	.95	.6	.....
29	1.0	.....	1.0	1.9	1.1	.8	.5	.75	.65	.95	.85	.....
30	.8	.....	1.1	1.85	1.1	.65	2.5	.7	.65	.95	.6	.....
31	.9	.....	.95	.....	1.0	.....	1.6	.55	.....	.95	.....	.....

NOTE.—Ice conditions Jan. 1–13, Feb. 3–8, 16–20, and Dec. 18–31.

Daily discharge, in second-feet, of Mora River at La Cueva, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10	11	8	28	115	46	2	47	0.8	2.1	9	9
2	10	11	8	24	102	28	2	20	.8	3	9	9
3	10	12	10	24	102	28	2	9	1.2	7	12	1.2
4	10	14	12	21	90	32	2	94	1.2	1.2	9	.8
5	10	16	18	19	90	28	1	34	1.2	7	12	3
6	10	17	18	19	78	28	2	14	.8	2.1	12	.8
7	10	15	18	16	78	28	1	14	1.2	4	12	.8
8	10	15	19	19	72	14	1	14	1.2	3	9	.8
9	10	15	19	19	66	9	.5	9	1.2	1.2	1.2	1.2
10	10	18	19	39	78	6	1	14	1.2	4	1.2	9
11	10	15	20	39	66	5	1	14	1.2	5	1.2	.8
12	10	24	20	48	66	5	1	23	1.2	.5	1.2	.8
13	10	18	27	87	78	7	3	20	.8	5	1.2	9
14	11	10	20	87	78	9	.5	14	7	7	1.2	9
15	11	6	20	87	78	44	.5	14	9	7	9	.5
16	14	6	20	75	66	23	.5	12	9	.5	3	1.2
17	14	6	21	89	66	16	.5	26	2.1	9	2.1	5
18	18	8	21	89	61	10	.5	26	2.1	5	9	.5
19	15	10	18	89	61	10	.5	26	2.1	3	7	.5
20	15	12	33	108	51	8	.5	12	1.2	2.1	3	1
21	21	15	25	114	51	9	.5	14	1.2	1.2	9	1
22	15	15	22	114	56	7	.5	14	9	3	3	1
23	15	12	29	114	56	3	.5	14	3	3	1.2	1
24	15	10	33	114	36	3	.5	5	1.2	3	1.2	1
25	15	10	39	102	36	3	1.5	3	5	1.2	9	1
26	22	12	39	115	36	20	0	3	7	9	2.1	1
27	22	12	35	122	28	20	0	3	7	9	.8	1
28	29	12	23	128	32	22	0	3	9	12	1.2	1
29	16	.....	23	128	36	10	0	4	2.1	12	7	1
30	6	.....	32	122	36	4	186	3	2.1	12	1.2	1
31	10	.....	21	.....	28	.....	68	.8	.....	12	.....	1

NOTE.—These discharges were obtained as follows: Jan. 1–13, Feb. 3–5, 16–20, and Dec. 20–31, estimated on account of ice. Jan. 14–Feb. 2 indirect method for shifting channels. Feb. 6–Mar. 7, based on a rating curve which is not well defined. Mar. 8–Apr. 26, indirect method for shifting channels. Apr. 27–June 12, based on a rating curve which is not well defined. June 13–Aug. 2, indirect method for shifting channels. Aug. 3–Dec. 19, based on a rating curve which is not well defined. Discharges interpolated for all other days for which no gage heights are given.

Monthly discharge of Mora River at La Cueva, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	29	.....	13.4	824	D.
February	24	.....	12.8	711	C.
March	39	8	22.3	1,370	C.
April	128	16	73.3	4,360	C.
May	115	28	63.6	3,910	C.
June	46	3	16.2	964	C.
July	186	0	9.05	556	C.
August	94	.8	16.9	1,040	C.
September	9	.8	3.10	184	C.
October	12	.5	5.04	310	C.
November	12	.8	5.33	317	C.
December	9	.....	2.76	170	C.
The year	186	0	20.3	14,700	

Discharge measurements of La Cueva canal at La Cueva, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 26	J. B. Stewart	8.8	7.6	1.18	7.6
June 12	.....do	8.0	7.3	.86	8.5
Aug. 30	W. W. Mills	7.1	4.3	.60	7.1
Oct. 21	G. H. Russell	6.7	4.0	.43	1.5
Nov. 30	C. B. Digby	8.0	8.8	.60	8.1

Daily gage height, in feet, of La Cueva canal at La Cueva, N. Mex., for 1910.

[Hugh Loudon, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.3	0.65	0.95	1.3	1.3	0.9	.....	0.65	1.05	.....	0.15
2	.....	.7	.75	1.2	1.2	.8	.....	.65	1.05	.....	.3
3	.....	.7	1.1	1.2	1.2	.8	1.0	.8	.5	.....	.55
4	.....	.7	.85	1.2	1.0	.75	.....	1.05	1.0	.....	.6
5	.....	.2	.9	1.25	1.2	.6	.....	1.1	.45	.....	.75
6	.....	.4	1.05	1.2	1.1	.6	1.0	1.0	1.1	.....	.6
7	.....	.75	1.15	1.4	1.0	.5	1.0	1.2	.7	.....	.55
8	.....	.75	1.2	1.35	1.0	.45	.95	1.15	.8	.....	.5
9	.....	.75	1.2	1.4	.9	.4	1.2	1.1	.95	0.6	.5
10	.....	.6	1.15	1.4	.9	.65	1.0	1.05	.7	.6	.05
11	.....	.7	1.15	1.35	.8	.5	1.2	1.05	.3	.6	.5
12	.....	.65	1.2	1.4	.95	.6	1.05	1.15	.8	.6	.5
13	.75	.....	1.15	1.45	.95	1.15	1.0	.9	.5	.6	.....
14	.5	.6	1.0	1.35	.9	.65	1.0	.75	.45	.6	.....
15	1.0	1.05	1.1	1.2	.85	.6	1.0	.75	.45	.2	.5
16	.....	1.0	1.0	1.15	.9	.6	1.0	.55	.8	.65	.5
17	.....	.75	1.15	.9	1.0	.7	.5	1.10	.6	.65	.2
18	.....	.8	1.1	1.1	.95	.5	.9	.95	.6	.3	.5
19	.....	.8	1.1	1.1	.9	.5	.3	1.15	1.2	.3	.5
20	.....	.2	1.3	1.1	.85	.5	1.1	1.10	1.1	.6	.....
21	.....	.85	1.1	1.1	.25	.6	1.1	.95	.75	.05	.....
22	.45	.8	1.05	1.15	.9	.6	.7	.4	1.15	.6	.....
23	.4	.8	1.3	1.2	.8	.6	.7	1.0	1.1	.6	.....
24	.4	1.15	1.25	1.1	.75	.7	1.15	.7	1.15	.6	.....
25	.4	.9	1.25	1.15	.85	.7	1.0	1.0	.8	.1	.....
26	.4	.9	1.25	1.15	1.1	.6	1.0	.7	.....	.6	.....
27	.4	1.15	1.3	1.15	1.3	.5	.75	.7	.....	.6	.....
28	.4	.95	1.35	1.25	.....	.45	1.0	.6	.....	.6	.....
29	.....	1.1	1.25	1.25	1.2	.4	.75	1.0	.....	.25	.....
30	.....	1.15	1.25	1.2	1.1	.....	.6	1.0	.....	.65	.....
31	.....	.95	.....	1.15	.....	.....	.7	.....	.....	.....	.....

NOTE.—No record for January. Ice Dec. 20-31. Canal was dry on all other days for which no gage heights are given.

Daily discharge, in second-feet, of La Cueva canal at La Cueva, N. Mex., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	2.5	5.0	10.0	15	10	0	8	10	0	2.5
2	0	3	2.8	8.5	13	8	0	8	10	0	4
3	0	3	7.0	9.0	13	8	13	9	2.5	0	7.5
4	0	3	3.5	9.0	10	8	0	14	9	0	8
5	0	0	4.3	10.0	14	6	0	15	2	0	8
6	0	.5	6.0	9	12	6	13	13	10	0	8
7	0	3.5	7.5	13	13	4.5	13	17	5	0	7.5
8	0	3.5	8.2	12	13	4.0	12	16	6	0	7
9	0	3.5	8.2	13	8	3.2	17	15	8	6	7
10	0	1.8	7.5	14	8	6.5	13	13	5	6	2
11	0	2.8	7.5	13	8	4.5	17	13	1	6	7
12	0	2.3	8.0	14	10	6	14	14	6	6	7
13	4.2	0	7.5	15	10	15	13	10	2.5	6	0
14	1.5	1.8	5.5	13	9	6.5	13	9	1.5	6	0
15	7.0	6.8	6.5	11	9	6	13	9	1.5	2	7
16	0	6.0	5.5	10	10	6	13	4	5	7	7
17	0	3.0	7.3	6	11	7.5	5	13	3	7	3
18	0	3.5	6.5	10	10	5	11	9	3	3	7
19	0	3.5	6.5	10	10	5	3	13	11	3	7
20	0	0	9.5	10	9	5	15	12	10	7	5
21	0	4.2	6.5	10	1	6	15	9	4.5	1	5
22	1.1	3.5	6.0	11	10	6	8	2	10	7.5	5
23	1.0	3.5	9.5	12	8	6	8	10	11	7.5	5
24	1.0	8.0	8.5	10	8	7.5	15	5	11	7.5	5
25	1.0	4.5	8.5	11	9	7.5	14	10	6	2	5
26	1.0	4.5	8.5	11	14	6	14	5	0	8	5
27	1.0	7.8	9.5	11	18	5	9	5	0	8	5
28	1.0	5.0	10.5	14	0	4	14	4	0	8	5
29	.....	7.0	9.0	14	16	3.5	9	9	0	3.5	5
30	.....	7.8	9.0	12	14	0	7	9	0	8.5	5
31	.....	5.0	.....	11	.....	0	8	.....	0	.....	5

NOTE.—These discharges were obtained by the indirect method for shifting channels.

Monthly discharge of La Cueva canal at La Cueva, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February	7	0	0.72	40	C.
March	8	0	3.70	228	C.
April	10.5	2.8	7.19	428	C.
May	15	6	11.2	689	C.
June	18	0	10.4	619	C.
July	15	0	5.88	362	C.
August	17	0	10.3	633	C.
September	17	2	10.1	601	C.
October	11	0	4.98	306	C.
November	8.5	0	4.22	251	C.
December	8	0	5.37	330	C.
The period	.....	.....	.....	4 199	

SAPELLO RIVER AT LOS ALAMOS, N. MEX.

This station, which was established August 22, 1903, to determine the amount of water available for diversion into the San Guijuella Reservoir for the Las Vegas project, is located about 100 yards upstream from the post office and general store at Los Alamos, N. Mex., 13 miles north of Las Vegas, the nearest railroad point.

The proposed reservoir lies about 6 miles northwest of Las Vegas, has a storage capacity of about 40,000 acre-feet, is to be filled from

the Gallinas, Sapello, and other streams in that vicinity, and is to be used for the irrigation of 10,000 acres of land. The station is situated about 4 miles below the mouth of the Manuelitos and a few miles above the junction of the Sapello with Mora River. A considerable portion of the normal flow of the stream is diverted for irrigation above the station.

The original gage was destroyed by a flood on September 29, 1904, and was replaced in April, 1905, by the present chain gage 400 feet upstream and at a different datum. Results for short periods during the winter season are sometimes affected by ice on this stream.

The channel is somewhat shifting in character, and on account of the inadequacy of discharge measurements, especially at the higher stages, results have not been entirely satisfactory. Discharge measurements are made from cable during high stages and by wading at miscellaneous sections during low stages. The cable is located about 200 feet above chain gage.

Discharge measurements of Sapello River at Los Alamos, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 6	G. H. Russell	9	3.1	−0.08	1.6
Mar. 7	Russell and Strong	9.5	4.2	− .04	2.3
Apr. 25	J. B. Stewart	12.8	5.5	+ .10	7.4
June 12	do	9	2.8	− .20	1.2
Aug. 12	do	7.5	1.6	− .10	3.1
30	W. W. Mills	12.4	3.0	− .10	1.6
Oct. 21	G. H. Russell	6.0	1.5	− .15	.75
Nov. 30	C. B. Digby	8.0	2.28	− .20	1.27

Daily gage height, in feet, of Sapello River at Los Alamos, N. Mex., for 1910.

[William Frank, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−0.1	−0.1	−0.15	0.0	0.1	−0.05	−0.2	.....	−0.1	.....	−0.1	−0.2
2	− .1	− .1	− .15	0	.1	− .05	− .2	.....	− .1	−0.2	− .1	− .2
3	− .05	− .1	− .15	0	.1	− .05	− .2	.....	− .2	− .2	− .1	− .2
4	− .05	− .1	− .15	0	.1	− .05	− .2	.....	− .15	− .2	− .1	− .15
5	− .05	− .1	− .15	−.05	.1	− .1	− .2	.....	− .1	− .2	− .1	− .1
6	− .05	− .1	− .15	−.05	.1	− .1	− .2	.....	− .1	− .2	− .1	− .1
7	− .05	− .1	0	−.05	.1	− .1	− .2	.....	− .2	− .2	− .15	− .1
8	− .05	− .1	.1	0	.1	− .1	− .2	.....	− .2	− .2	− .2	− .1
9	0	− .1	− .1	0	.1	− .2	− .2	.....	− .2	− .2	− .15	− .1
10	0	− .1	− .1	0	.1	− .2	− .1	.....	− .2	− .2	− .15	− .1
11	0	− .1	− .1	0	.1	− .2	− .1	.....	− .2	− .2	− .15	− .1
12	0	− .1	− .1	0	.1	− .2	− .2	−0.1	− .2	− .2	− .15	− .1
13	0	− .1	− .1	0	.1	0	− .2	− .1	− .2	− .2	− .15	− .1
14	0	− .1	− .1	.1	.1	0	.....	− .1	− .15	− .2	− .15	− .1
15	0	− .1	− .1	.2	0	.75	.....	− .1	− .1	− .2	− .15	− .1
16	− .05	− .1	− .1	.3	0	− .1	.....	− .2	− .15	− .2	− .15	− .1
17	− .1	− .1	− .1	.2	0	− .2	.....	− .2	− .2	− .2	− .15	− .1
18	− .1	− .1	− .1	.2	.05	− .2	.....	1.35	− .2	− .2	− .2	− .1
19	− .1	− .1	− .1	.2	.05	− .2	.....	.15	− .2	− .15	− .2	− .1
20	− .1	− .2	− .1	.2	.05	− .2	.....	0	− .2	− .15	− .2	− .1

Daily gage height, in feet, of Sapello River at Los Alamos, N. Mex., for 1910.—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
21	−0.1	−0.15	−0.1	0.2	0.05	−0.2	.....	0	−0.15	−0.15	−0.2	−0.05
22	− .1	− .15	− .1	.2	0	− .2	.....	0	− .05	− .15	− .2	− .05
23	− .1	− .15	− .1	.2	0	− .2	.....	0.3	− .1	− .2	− .2	− .05
24	− .1	− .15	− .1	.2	0	− .2	.....	0	− .2	− .15	− .2	− .05
25	− .1	− .15	− .1	.1	0	− .2	.....	− .1	− .2	− .15	− .2	− .05
26	− .1	− .15	.05	.1	0	− .2	.....	− .1	− .2	− .15	− .2	− .05
27	− .1	− .15	0	.1	0	− .2	.....	− .1	− .2	− .15	− .2	− .05
28	− .1	− .15	0	.1	0	− .2	.....	− .1	− .2	− .15	− .2	− .1
29	− .1	.....	0	.1	−.05	− .2	.....	.05	− .2	− .15	− .2	− .1
30	− .1	.....	0	.1	−.05	− .2	.....	− .1	− .2	− .15	− .2	− .1
31	− .1	.....	0	.....	−.05	.....	.....	− .1	.....	− .15	.....	− .1

Daily discharge, in second-feet, of Sapello River at Los Alamos, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	1.5	1.0	3.2	7.4	3.8	1.2	.....	1.5	0.6	1.5	1.2
2	1.5	1.5	1.0	3.2	7.4	3.8	1.2	.....	1.5	.6	1.5	1.2
3	2.4	1.5	1.0	3.2	7.4	3.8	1.2	.....	.6	.6	1.5	1.2
4	2.4	1.5	1.0	3.2	7.4	3.8	1.2	.....	1.0	.6	1.5	2.0
5	2.4	1.5	1.0	2.4	7.4	2.8	1.2	.....	1.5	.6	1.5	2.8
6	2.4	1.5	1.0	2.4	7.4	2.8	1.2	.....	1.5	.6	1.5	2.8
7	2.4	1.5	3.2	2.4	7.4	2.8	1.2	.....	.6	.6	1.0	2.8
8	2.4	1.5	6.3	3.2	7.4	2.8	1.2	.....	.6	.6	.6	2.8
9	3.2	1.5	1.5	3.2	7.4	1.2	1.2	.....	.6	.6	1.0	2.8
10	3.2	1.5	1.5	3.2	7.4	1.2	2.8	.....	.6	.6	1.0	2.8
11	3.2	1.5	1.5	3.2	7.4	1.2	2.8	.....	.6	.6	1.0	2.8
12	3.2	1.5	1.5	3.2	7.4	1.2	1.2	2.8	.6	.6	1.0	2.8
13	3.2	1.5	1.5	3.2	7.4	4.9	1.2	2.8	.6	.6	1.5	2.8
14	3.2	1.5	1.5	6.3	7.4	4.9	.....	2.8	1.0	.6	2.0	2.8
15	3.2	1.5	1.5	10.2	4.9	46	.....	2.8	1.5	.6	2.0	2.8
16	2.4	1.5	1.5	14.8	4.9	2.8	.....	1.2	1.0	.6	2.0	2.8
17	1.5	1.5	1.5	10.7	4.9	1.2	.....	1.2	.6	.6	2.0	2.8
18	1.5	1.5	1.5	10.7	6.2	1.2	.....	112	.6	.6	1.2	2.8
19	1.5	1.5	1.5	10.7	6.2	1.2	.....	8.2	.6	1.0	1.2	2.8
20	1.5	.6	1.5	10.7	6.2	1.2	.....	3.2	.6	1.0	1.2	2.8
21	1.5	1.0	1.5	10.7	6.2	1.2	.....	3.2	1.0	1.0	1.2	3.8
22	1.5	1.0	1.5	10.7	4.9	1.2	.....	3.2	2.4	1.0	1.2	3.8
23	1.5	1.0	1.5	10.7	4.9	1.2	.....	14.8	1.5	.6	1.2	3.8
24	1.5	1.0	1.5	10.7	4.9	1.2	.....	3.2	.6	1.0	1.2	3.8
25	1.5	1.0	1.5	7.4	4.9	1.2	.....	1.5	.6	1.0	1.2	3.8
26	1.5	1.0	4.8	7.4	4.9	1.2	.....	1.5	.6	1.0	1.2	3.8
27	1.5	1.0	3.2	7.4	4.9	1.2	.....	1.5	.6	1.0	1.2	3.8
28	1.5	1.0	3.2	7.4	4.9	1.2	.....	1.5	.6	1.0	1.2	2.8
29	1.5	.....	3.2	7.4	3.8	1.2	.....	4.8	.6	1.0	1.2	2.8
30	1.5	.....	3.2	7.4	3.8	1.2	.....	1.5	.6	1.0	1.2	2.8
31	1.5	.....	3.2	.....	3.8	.....	.....	1.5	.....	1.0	.....	2.8

NOTE.—These discharges are based on curves applicable as follows: Jan. 1–Apr. 16 and Aug. 18–Dec. 31, fairly well defined; Apr. 17–Aug. 17, fairly well defined.

Monthly discharge of Sapello River at Los Alamos, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3.2	1.5	2.09	129	B.
February	1.5	.6	1.32	73	C.
March	6.3	1	2	123	B.
April	14.8	2.4	6.68	397	B.
May	7.4	3.8	6.09	374	B.
June	46	1.2	3.55	211	B.
July (1-13)	2.8	1.2	1.45	37	B.
August (12–31)	112	1.2	8.76	348	B.
September	2.4	.6	.89	53	C.
October	1	.6	.75	46	C.
November	2	.6	1.32	79	C.
December	3.8	1.2	2.85	175	C.
The period	.....	.....	.....	2050	

UTE CREEK NEAR LOGAN, N. MEX.

This station, which was reestablished April 13, 1909, to obtain records of the flow available for storage and irrigation, is located 7 miles northwest of Logan, N. Mex., 4 miles above the mouth of Ute Creek and 100 yards northwest of the old Martínez house. The station is maintained in cooperation with the Territorial engineer of New Mexico.

No important tributaries enter Ute Creek below the station or for several miles above. The stream is intermittent in character and most of the run-off water is derived from heavy rains on the basin. A little water is diverted for irrigation above the station, but storage is necessary in order to utilize any considerable proportion of the flow for that purpose. Several reservoir sites are located in that vicinity, the best known of which is probably the Ute Creek reservoir site, a few miles above the gaging station.

Measurements are made by wading near the gage. Estimates of flood discharge have been made by Kutter's formula. To obtain good results it will be necessary to install a cable in the vicinity of the gage. The stream bed is very shifting in character and the creek is subject to sudden rises, so that results obtained will at best be only moderately accurate.

The location and datum of the inclined rod gage has remained constant and is the same as that used by the United States Reclamation Service from August 12, 1904, to June 30, 1906.

Discharge measurements of Ute Creek near Logan, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 31	G. H. Russell	8	1.1	0.42	0.23
Mar. 15	do				*a*.1
May 7	J. B. Stewart				0
June 17	do			.52	0
Aug. 1	do	58	51	1.45	177
3	do	42	18.6	1.22	31.8
24	W. W. Mills	24	9.2	1.40	10.2
Oct. 14	G. H. Russell			.81	*a*.1
Dec. 20	W. B. Freeman				*a*.1

a Estimated.

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of Ute Creek near Logan, N. Mex., for 1910.

[Eligio Martinez, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	0.4	0.2	0.2	0.2	0.2	1.0	2.5	0.4	0.2
2	0.55	.4	.2	.2	.2	.2	.9	3.25	.85	.....
3	.55	.4	.2	.2	.2	.2	1.6	2.6	1.05	.....
4	.5	.4	.2	.2	.2	.2	1.25	4.05	.65	.....
5	3.6	.4	.2	.2	.2	.2	1.4	1.6	.7	.....
6	3.15	.3	.2	.2	.2	.2	2.1	1.2	.75	.....
7	2.2	.3	.2	.2	.2	.2	1.6	1.2	.8	.....
8	.95	.3	.2	.2	.2	.2	1.6	1.1	.8	.....
9	.6	.3	.2	.2	.2	.2	2.6	.95	.8	.....
10	.6	.3	.2	.2	.2	.2	6.2	4.4	.8	.....
11	.6	.3	.2	.2	.2	.2	5.5	1.8	.2	.....
12	.6	.3	.2	.2	.2	.5	5.0	3.0	.2	.....
13	.6	.4	.2	.2	.2	.5	4.5	1.3	.2	.....
14	.6	.4	.2	.2	.2	.5	4.0	1.5	.2	.....
15	.6	.4	.2	.2	.2	.5	4.05	1.5	.2	.....
16	.4	.4	.2	.2	.2	.5	3.45	1.0	.2	.....
17	.4	.4	.2	.2	.2	.5	1.4	2.0	.2	.....
18	.4	.4	.2	.2	.2	.5	1.3	4.9	.2	.....
19	.4	.4	.2	.2	.2	.5	1.25	2.7	.2	.....
20	.4	.2	.2	.2	.2	.5	1.2	1.8	.2	.....
21	.4	.2	.2	.2	.2	.5	1.2	1.2	.2	.....
22	.4	.2	.2	.2	.2	.5	.9	1.3	.2	.....
23	.4	.2	.2	.2	.2	.5	.8	1.1	.2	.....
24	.4	.2	.2	.2	.2	.5	.5	1.35	.2	.....
25	.4	.2	.2	.2	.2	.5	.4	1.15	.2	.....
26	.4	.2	.2	.2	.2	1.4	.3	1.05	.2	.....
27	.4	.2	.2	.2	.2	1.1	.3	.7	.2	.....
28	.4	.2	.2	.2	.2	1.05	.35	.4	.2	.....
29	.4	.....	.2	.2	.2	1.0	.35	.4	.2	.....
30	.4	.....	.2	.2	.2	1.0	1.0	.4	.2	.....
31	.4	.....	.2	.....	.2	.....	3.65	.4	.....	.....

NOTE.—Observer reported the creek dry after Oct. 2.

Daily discharge, in second-feet, of Ute Creek near Logan, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2	0.2	0.1	0	0	0	21	560	0	0	0	0
2	3	.2	.1	0	0	0	13	1,210	0	0	0	0
3	3	.2	.1	0	0	0	136	640	6	0	0	0
4	2	.2	.1	0	0	0	58	2,120	0	0	0	0
5	1,590	.2	.1	0	0	0	88	100	0	0	0	0
6	1,120	.1	.1	0	0	0	310	24	0	0	0	0
7	360	.1	.1	0	0	0	136	24	0	0	0	0
8	8	.1	.1	0	0	0	136	13	0	0	0	0
9	4	.1	.1	0	0	0	640	6	0	0	0	0
10	4	.1	.1	0	0	0	6,280	2,710	0	0	0	0
11	4	.1	.1	0	0	0	4,700	120	0	0	0	0
12	4	.1	.1	0	0	0	3,700	980	0	0	0	0
13	4	.2	.1	0	0	0	2,800	22	0	0	0	0
14	4	.2	.1	0	0	0	2,050	42	0	0	0	0
15	4	.2	.1	0	0	0	2,120	42	0	0	0	0
16	.2	.2	.1	0	0	0	1,420	4	0	0	0	0
17	.2	.2	.1	0	0	0	88	200	0	0	0	0
18	.2	.2	.1	0	0	6	67	3,530	0	0	0	0
19	.2	.2	.1	0	0	0	58	720	0	0	0	0
20	.2	.1	.1	0	0	0	49	84	0	0	0	0
21	.2	.1	.1	0	0	0	49	6	0	0	0	0
22	.2	.1	.1	0	0	0	13	9	0	0	0	0
23	.2	.1	.1	0	0	0	8	2	0	0	0	0
24	.2	.1	.1	0	0	0	.2	8	0	0	0	0
25	.2	.1	.1	0	0	0	0	4	0	0	0	0
26	.2	.1	.1	0	0	88	0	2	0	0	0	0
27	.2	.1	.1	0	0	33	0	0	0	0	0	0
28	.2	.1	.1	0	0	27	0	0	0	0	0	0
29	.2	.....	.1	0	0	21	0	0	0	0	0	0
30	.2	.....	.1	0	0	21	21	0	0	0	0	0
31	.2	.....	.1	.....	0	.....	1,640	0	.....	0	.....	0

NOTE.—These discharges were obtained as follows: Jan. 1-31, based on a rating curve which is well defined; Feb. 1-June 25, estimated from hydrographer's notes; June 26-July 30, based on a rating curve which is fairly well defined; July 31-Sept. 3, indirect method for shifting channels. There may have been some flow at times during the periods for which zero flow is given, but if so, it was practically negligible.

Monthly discharge of Ute Creek near Logan, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,590	0.2	101	6,210	B.
February	.2	.1	.14	8	C.
March	.1	.1	.10	6	C.
April	0	0	0	0	
May	0	0	0	0	
June	88	0	6.33	377	C.
July	6,280	0	858	52,800	B.
August	3,530	0	425	26,100	B.
September	6	0	.20	12	C.
October	0	0	0	0	
November	0	0	0	0	
December	0	0	0	0	
The year	6,280	0	118	85,500	

YAZOO RIVER DRAINAGE BASIN.

DESCRIPTION.

Yazoo River is formed by the union of Tallahatchie and Yalobusha rivers just above Greenwood, Miss., whence it flows southward and southwestward to its junction with the Mississippi at Vicksburg.

Tallahatchie River and its large tributary Coldwater River rise in the northern part of Mississippi. Yokona River, also an important tributary of the Tallahatchie, comes in from the east just above the mouth of the Coldwater. Yalobusha River rises in the northern part of the State, farther east than the other tributaries. Sunflower River, which empties into the Yazoo about 20 miles above Vicksburg, drains a narrow basin along the upper western border of the State which is cut off from Mississippi River by the levees.

The drainage area may be divided into two distinct parts, the delta and the hill lands. The delta comprises a strip of land east of the Mississippi extending from the State line on the north to Vicksburg on the south, about 60 miles wide at the center and decreasing in width to about 5 miles at either end. The hill lands comprise the portion of the drainage area located to the east of the delta. The entire delta is traversed by many small streams and bayous and contains numerous so-called lakes, which are really old river channels. During high-water periods the natural channels carry water from one stream to another, and large areas are covered by overflow water.

Except for the land that has been cleared for cultivation—at present a relatively small amount—the drainage area is forested. The mean annual precipitation is about 50 inches. Yazoo River is navigable for its entire length, and most of the larger tributaries are navigable for small boats. The tributaries are used to some extent for logging.

The data collected in the drainage basin are of value for drainage and navigation problems. The Tallahatchie drainage commission is engaged in a drainage project in the upper portion of the basin.

TALLAHATCHIE RIVER AT BATESVILLE, MISS.

This station, which is located at the county highway bridge 1 mile west of Batesville and about 2 miles below the crossing of the Illinois Central Railroad, was established on June 15, 1906. The record has been continuous since that time except for a break from August 1 to September 19, 1906. The station is now maintained in connection with the Tallahatchie drainage commission.

The ground on the right bank is low for a mile or more, but the road has been raised above high water except at a number of bridged openings.

Discharge measurements can be conveniently made at all stages, and the relation between gage heights and discharge should be fairly constant. A chain gage attached to the bridge is used, the datum of which has remained the same.

Discharge measurements of Tallahatchie River at Batesville, Miss., in 1910.

[By engineers of the Tallahatchie drainage commission.]

Date.	Width.	Area of section.	Gage height.	Discharge.	Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 1	210	2,140	14.04	5,600	Apr. 20	185	1,700	10.54	4,300
Apr. 18	173	1,460	9.44	3,590	21	188	1,780	11.17	4,830
19	181	1,610	9.98	4,030					

Daily gage height, in feet, of Tallahatchie River at Batesville, Miss., for 1910.

[J. S. Goff, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	4.9	14.1	3.9	4.6	8.5	4.5	4.1	3.3	2.4	2.4	2.8
2	4.2	4.8	13.3	3.9	4.4	6.9	5.7	3.9	3.7	2.4	2.4	2.8
3	3.9	5.0	12.3	3.9	4.1	4.8	7.7	3.9	3.6	2.4	2.4	2.8
4	3.7	5.2	11.4	3.8	4.0	4.2	7.9	3.7	3.4	2.4	2.5	2.8
5	6.0	4.7	10.6	3.9	3.8	4.5	7.9	3.6	3.2	2.6	2.5	2.8
6	12.1	4.6	9.7	3.8	3.7	4.0	7.7	3.5	3.0	2.4	2.5	3.5
7	10.9	4.6	8.9	3.9	3.7	3.7	7.9	4.0	3.0	2.5	2.5	3.2
8	9.1	4.6	8.0	4.0	3.6	3.6	12.6	4.8	3.0	2.7	2.5	3.9
9	8.8	4.4	7.4	4.1	3.5	4.0	14.4	4.1	3.0	3.0	2.5	3.2
10	8.4	4.3	6.6	3.8	3.4	11.6	14.6	4.5	3.0	2.8	2.5	3.2
11	8.6	4.2	5.7	3.7	3.4	9.5	16.3	4.3	3.0	2.7	2.5	3.2
12	9.3	4.1	5.3	3.6	3.4	8.9	17.1	3.9	2.9	2.8	2.5	3.2
13	9.2	4.1	5.0	3.5	3.3	8.7	16.6	4.0	2.8	2.7	2.5	3.1
14	9.1	4.0	4.8	3.4	3.2	8.6	15.9	4.2	2.8	2.7	2.5	3.0
15	9.7	4.1	4.7	9.2	3.2	8.6	15.1	3.8	2.7	2.7	2.5	2.8
16	9.3	4.7	4.6	8.7	3.1	8.9	14.2	3.6	2.7	3.0	2.5	2.8
17	9.1	5.2	4.4	9.3	4.0	8.5	13.2	3.5	2.7	2.8	2.4	2.8
18	8.4	6.1	4.3	9.4	3.4	8.1	13.8	3.4	2.7	2.7	2.4	2.7
19	8.2	7.2	4.2	9.8	3.3	8.6	14.6	3.3	2.6	2.8	2.4	2.7
20	8.0	7.4	4.1	10.3	4.9	8.6	12.7	4.0	2.6	2.7	2.4	2.7
21	9.5	10.7	4.1	11.0	6.1	6.5	10.9	6.2	2.6	2.7	2.4	2.7
22	8.4	11.1	4.0	11.6	7.1	4.6	9.5	3.3	2.5	2.7	2.4	2.6
23	8.3	11.3	4.0	12.0	7.6	4.5	7.7	3.2	2.5	2.6	2.4	3.1
24	8.3	11.5	3.9	11.9	8.0	4.0	7.0	4.6	2.5	2.6	2.4	3.3
25	8.4	11.9	3.9	11.4	9.5	3.9	12.6	4.5	2.5	2.5	2.4	3.3
26	8.5	12.8	3.9	10.7	8.6	4.3	10.4	4.0	2.4	2.5	2.4	3.3
27	8.4	13.9	3.8	8.9	8.7	4.4	8.1	3.5	2.5	2.5	2.5	3.3
28	8.2	14.5	3.9	7.0	9.0	4.5	5.7	3.7	2.6	2.4	2.5	3.4
29	8.0	.....	3.9	6.4	9.1	4.9	4.8	3.9	2.4	2.4	2.5	4.8
30	7.6	.....	3.9	4.9	9.2	4.4	4.4	3.8	2.4	2.4	2.5	5.7
31	7.3	.....	3.9	.....	9.1	.....	4.2	3.5	.....	2.4	.....	5.4

Daily discharge, in second-feet, of Tallahatchie River at Batesville, Miss., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,100	1,290	7,390	919	1,170	2,970	1,140	991	713	425	425	549
2	1,030	1,250	6,550	919	1,100	2,140	1,600	919	849	425	425	549
3	919	1,320	5,640	919	991	1,250	2,540	919	815	425	425	549
4	849	1,400	4,900	883	955	1,030	2,650	849	747	425	455	549
5	1,730	1,210	4,320	919	883	1,140	2,650	815	679	485	455	549
6	5,480	1,170	3,700	883	849	955	2,540	781	613	425	455	781
7	4,530	1,170	3,200	919	849	849	2,650	955	613	455	455	679
8	3,320	1,170	2,700	955	815	815	5,910	1,250	613	517	455	919
9	3,140	1,100	2,390	991	781	955	7,720	991	613	613	455	679
10	2,920	1,060	2,000	883	747	5,060	7,950	1,140	613	549	455	679
11	3,020	1,030	1,600	849	747	3,570	10,200	1,060	613	517	455	679
12	3,440	991	1,440	815	747	3,200	11,400	919	581	549	455	679
13	3,380	991	1,320	781	713	3,080	10,700	955	549	517	455	645
14	3,320	955	1,250	747	679	3,020	9,620	1,030	549	517	455	613
15	3,700	991	1,210	3,380	679	3,020	8,550	883	517	517	455	549
16	3,440	1,210	1,170	3,080	645	3,200	7,500	815	517	613	455	549
17	3,320	1,400	1,100	3,440	955	2,970	6,460	781	517	549	425	549
18	2,920	1,770	1,060	3,500	747	2,750	7,060	747	517	517	425	517
19	2,800	2,290	1,030	3,760	713	3,020	7,950	713	485	549	425	517
20	2,700	2,390	991	4,110	1,290	3,020	6,000	955	485	517	425	517
21	3,570	4,390	991	4,600	1,770	1,950	4,530	1,820	485	517	425	517
22	2,920	4,680	955	5,060	2,240	1,170	3,570	713	455	517	425	485
23	2,860	4,820	955	5,390	2,490	1,140	2,540	679	455	485	425	645
24	2,860	4,980	919	5,300	2,700	955	2,190	1,170	455	485	425	713
25	2,920	5,300	919	4,900	3,570	919	5,910	1,140	455	455	425	713
26	2,970	6,090	919	4,390	3,020	1,060	4,180	955	425	455	425	713
27	2,920	7,170	883	3,200	3,080	1,100	2,759	781	455	455	455	713
28	2,800	7,830	919	2,190	3,260	1,140	1,600	849	485	425	455	747
29	2,700	.....	919	1,910	3,320	1,290	1,250	919	425	425	455	1,250
30	2,490	.....	919	1,290	3,380	1,100	1,100	883	425	425	455	1,600
31	2,340	.....	919	.....	3,320	.....	1,030	781	.....	425	.....	1,480

NOTE.—These discharges were obtained from a rating curve which is well defined.

Monthly discharge of Tallahatchie River at Batesville, Miss., for 1910.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	5,480	849	2,850	A.
February	7,830	955	2,550	A.
March	7,390	883	2,100	A.
April	5,390	747	2,400	A.
May	3,570	645	1,590	A.
June	5,060	815	1,990	A.
July	11,400	1,030	4,950	A.
August	1,820	679	941	A.
September	849	425	557	A.
October	613	425	490	B.
November	455	425	442	B.
December	1,600	485	706	A.
The year	11,400	425	1,800	

TALLAHATCHIE RIVER AT PHILIPP, MISS.

This station is located at the Yazoo & Mississippi Valley Railroad bridge at Philipp. It was established September 6, 1908, for the purpose of obtaining run-off data in connection with the work of the Tallahatchie drainage commission.

The stream above the station will at times overflow the surrounding country for a distance of several miles on either side. The overflow,

however, with small exceptions, is intercepted by the railroad embankment and is made to flow in the main channel at the gaging station, and a few trestled openings in the railroad embankment. Variations in the relative stage of the river below the station will probably so affect the slope as to disturb the relation between gage heights and discharge. Judging by the plotting of the discharge measurements so far made, this disturbance does not appear to be great.

The datum of the gage, which is a vertical staff, is mean sea level; the gage readings therefore represent elevations above sea level. Measurements are made from the downstream side of the railway bridge.

Discharge measurements of Tallahatchie River at Philipp, Miss., in 1910.

[By engineers of the Tallahatchie drainage commission.]

Date.	Width.	Area of section.	Gage height.	Discharge.
	Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 4	240	4,370	120.4	9,650
10	275	5,030	130.7	10,900

Daily gage height, in feet, of Tallahatchie River at Philipp, Miss., for 1910.

[J. P. Mahoney, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	123.6	129.2	119.1	116.5	130.0	128.0	124.0	133.7	115.5	112.5	112.4	112.1
2	123.5	129.0	120.2	116.2	130.2	128.0	123.5	133.5	115.3	112.5	112.3	112.2
3	123.2	128.9	120.3	116.0	130.3	127.9	123.5	133.0	114.9	112.4	112.3	112.2
4	122.7	128.4	120.4	115.8	130.3	127.7	124.0	132.6	114.6	112.4	112.2	112.3
5	122.0	127.9	120.5	115.8	130.3	127.9	124.6	132.0	114.6	112.4	112.2	112.6
6	122.0	127.3	120.9	115.9	130.2	126.0	125.5	131.5	114.7	112.5	112.2	112.9
7	122.9	126.3	130.0	116.6	129.8	124.6	126.5	130.8	114.7	113.0	112.2	113.2
8	124.0	125.0	130.4	117.2	129.2	123.3	127.3	129.8	114.8	114.4	112.2	113.6
9	125.0	123.5	130.6	117.7	128.4	121.4	128.3	128.8	115.0	114.8	112.2	113.5
10	125.8	122.0	130.7	118.1	127.0	121.7	129.0	127.5	115.1	115.0	112.2	113.5
11	126.4	120.9	130.8	118.3	125.4	122.3	129.7	126.0	115.0	115.2	112.2	113.4
12	126.7	119.7	130.8	118.3	123.6	122.3	130.5	124.4	114.7	115.1	112.2	113.3
13	127.0	118.7	130.8	117.6	121.5	123.0	131.3	122.9	114.4	115.0	112.2	113.3
14	127.5	118.0	130.8	117.3	119.9	123.5	132.0	121.4	114.1	114.7	112.2	113.2
15	127.6	117.6	130.6	117.6	118.5	124.0	132.6	120.0	113.7	115.0	112.2	113.2
16	127.7	117.1	130.5	120.4	117.4	124.5	133.0	118.8	113.5	114.6	112.2	113.1
17	127.8	117.6	130.3	123.0	116.8	124.7	133.4	117.9	113.3	114.9	112.2	113.0
18	128.0	118.8	130.0	124.7	116.6	125.0	133.6	117.4	113.1	114.5	112.2	112.8
19	128.0	118.8	129.5	125.7	117.2	125.4	133.8	116.8	113.0	114.1	112.2	112.7
20	128.2	118.9	129.0	126.5	117.7	125.6	133.9	116.3	113.0	114.6	112.1	112.6
21	128.6	118.9	128.0	127.0	118.9	125.8	134.0	116.0	112.9	115.0	112.1	112.6
22	128.7	119.1	127.0	127.5	121.2	126.3	134.1	117.5	112.9	114.8	112.1	112.5
23	128.9	119.2	125.7	127.9	122.5	126.5	134.2	118.5	112.8	114.5	112.1	112.5
24	129.0	119.3	124.0	128.3	123.7	126.7	134.3	118.4	112.8	114.2	112.1	113.1
25	129.1	119.5	122.5	128.5	124.8	127.0	134.3	118.8	112.8	113.6	112.1	113.7
26	129.2	119.6	121.0	128.9	125.8	126.4	134.3	118.9	112.7	113.2	112.1	114.1
27	129.3	119.8	119.5	129.0	126.9	125.8	134.3	118.2	112.7	113.0	112.1	114.2
28	129.4	119.9	118.6	129.4	127.1	125.5	134.2	117.4	112.6	112.8	112.1	114.3
29	129.5	.....	117.8	129.6	127.5	125.4	134.0	116.5	112.5	112.6	112.1	114.5
30	129.4	.....	117.3	129.9	127.7	124.6	133.9	115.7	112.5	112.5	112.1	114.8
31	129.3	.....	116.7	.....	127.9	.....	133.8	115.5	.....	112.4	.....	115.9

Daily discharge, in second-feet, of Tallahatchie River at Philipp, Miss., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,160	9,520	3,510	2,260	10,000	8,800	6,400	13,500	1,880	1,030	1,010	956
2	6,100	9,400	4,120	2,140	10,100	8,800	6,100	13,200	1,800	1,030	990	972
3	5,920	9,340	4,180	2,060	10,200	8,740	6,100	12,500	1,660	1,010	990	972
4	5,620	9,040	4,240	1,980	10,200	8,620	6,400	12,000	1,560	1,010	972	990
5	5,200	8,740	4,300	1,980	10,200	8,740	6,760	11,400	1,560	1,010	972	1,050
6	5,200	8,380	4,540	2,020	10,100	7,600	7,300	11,000	1,600	1,030	972	1,110
7	5,740	7,780	10,000	2,300	9,880	6,760	7,900	10,500	1,600	1,130	972	1,170
8	6,400	7,000	10,200	2,570	9,520	5,980	8,380	9,880	1,630	1,500	972	1,270
9	7,000	6,100	10,400	2,800	9,040	4,840	8,980	9,280	1,700	1,630	972	1,250
10	7,480	5,200	10,400	2,990	8,200	5,020	9,400	8,500	1,740	1,700	972	1,250
11	7,840	4,540	10,500	3,100	7,240	5,380	9,820	7,600	1,700	1,770	972	1,220
12	8,020	3,840	10,500	3,100	6,160	5,380	10,300	6,640	1,600	1,740	972	1,200
13	8,200	3,300	10,500	2,750	4,900	5,800	10,800	5,740	1,500	1,700	972	1,200
14	8,500	2,940	10,500	2,620	3,950	6,100	11,400	4,840	1,410	1,600	972	1,170
15	8,560	2,750	10,400	2,750	3,200	6,400	12,000	4,000	1,300	1,700	972	1,170
16	8,620	2,520	10,300	4,240	2,660	6,700	12,500	3,360	1,250	1,560	972	1,150
17	8,680	2,750	10,200	5,800	2,390	6,820	13,000	2,890	1,200	1,660	972	1,130
18	8,800	3,360	10,000	6,820	2,300	7,000	13,400	2,660	1,150	1,530	972	1,090
19	8,800	3,360	9,700	7,420	2,570	7,240	13,700	2,390	1,130	1,410	972	1,070
20	8,920	3,410	9,400	7,900	2,800	7,360	13,900	2,180	1,130	1,560	956	1,050
21	9,160	3,410	8,800	8,200	3,410	7,480	14,100	2,060	1,110	1,700	956	1,050
22	9,220	3,510	8,200	8,500	4,720	7,780	14,300	2,700	1,110	1,630	956	1,030
23	9,340	3,570	7,420	8,740	5,500	7,900	14,500	3,200	1,090	1,530	956	1,030
24	9,400	3,620	6,400	8,980	6,220	8,020	14,800	3,150	1,090	1,440	956	1,150
25	9,460	3,730	5,500	9,100	6,880	8,200	14,800	3,360	1,090	1,270	956	1,300
26	9,520	3,780	4,600	9,340	7,480	7,840	14,800	3,410	1,070	1,170	956	1,410
27	9,580	3,890	3,730	9,400	8,140	7,480	14,800	3,040	1,070	1,130	956	1,440
28	9,640	3,950	3,250	9,640	8,260	7,300	14,500	2,660	1,050	1,090	956	1,470
29	9,700	.....	2,840	9,760	8,500	7,240	14,100	2,260	1,030	1,050	956	1,530
30	9,640	.....	2,620	9,940	8,620	6,760	13,900	1,940	1,030	1,030	956	1,630
31	9,580	.....	2,340	.....	8,740	.....	13,700	1,880	.....	1,010	.....	2,020

NOTE.—These discharges were obtained from a rating curve which is fairly well defined between 1,100 and 9,400 second-feet. Above 9,400 second-feet the rating is only approximate, as the stage of the river below causes much variation in slope and the higher measurements include large amounts of overflow which was very roughly measured.

Monthly discharge of Tallahatchie River at Philipp, Miss., for 1910.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	9,700	5,200	8,060	A.
February	9,520	2,520	5,100	A.
March	10,500	2,340	7,210	A.
April	9,940	1,980	5,370	A.
May	10,200	2,300	6,840	A.
June	8,800	4,840	7,140	A.
July	14,800	6,100	11,400	B.
August	13,500	1,880	5,950	A.
September	1,880	1,030	1,360	A.
October	1,770	1,010	1,370	B.
November	1,010	956	969	B.
December	2,020	956	1,210	B.
The year	14,800	956	5,180	

YAZOO RIVER AT GREENWOOD, MISS.

This station, which is located at the highway bridge at Greenwood, a point about 1 mile below the junction of Yalobusha River, was established July 15, 1908, for the purpose of obtaining general run-off data applicable to navigation and drainage problems, and is maintained in cooperation with the Tallahatchie drainage commission.

There are no artificial diversions of water above the station, and all natural diversions return to river above unless at extreme floods some overflow water may be lost to Sunflower River. The conditions at the station are favorable for accurate discharge measurements at all stages, but it is expected that the relation between gage heights and discharges will be greatly disturbed by changes in slope of Yazoo River, caused by varying stages of Mississippi River.

The chain gage is fastened to the downstream handrail of the bridge. Its datum is mean sea level and has not been changed. Discharge measurements are made from this bridge. The United States Weather Bureau has maintained a gage here since November 1, 1904, the datum of which was 92.5 feet above sea level.

Daily gage height, in feet, of Yazoo River at Greenwood, Miss., for 1910.

[W. T. Davis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	103.73	111.03	113.90	98.69	108.69	108.99	106.42	117.85	97.04	93.93	93.93	93.56
2	103.53	110.58	114.12	98.13	108.73	108.73	106.28	117.64	96.80	93.85	93.84	93.56
3	103.29	110.14	114.29	97.75	108.77	108.35	106.13	117.09	96.48	93.81	93.77	93.56
4	102.93	109.70	114.42	97.46	108.85	107.95	106.55	116.49	96.13	93.76	93.73	93.61
5	102.54	109.20	114.55	97.29	108.91	107.74	107.14	115.89	95.88	93.75	93.72	93.70
6	103.09	108.67	114.63	97.19	108.89	107.46	108.21	115.28	95.90	94.08	93.70	93.91
7	105.45	107.99	114.67	97.27	108.80	106.86	109.31	114.62	96.06	96.13	93.70	94.22
8	106.73	107.14	114.59	97.54	108.58	105.99	110.22	114.02	96.00	97.88	93.70	94.88
9	107.10	106.11	114.40	97.94	108.16	104.91	110.99	113.25	95.93	97.89	93.70	95.10
10	107.46	104.96	114.05	98.28	107.56	103.93	111.71	112.42	95.89	97.23	93.70	94.96
11	107.89	103.80	113.62	98.56	106.68	103.84	112.59	111.40	95.88	96.84	93.68	94.91
12	108.25	102.66	113.16	98.71	105.51	104.73	113.66	110.31	95.82	96.56	93.66	94.80
13	108.44	101.55	112.74	98.63	104.14	105.23	114.83	109.09	95.64	96.56	93.66	94.67
14	108.46	100.61	112.31	98.39	102.70	105.48	115.92	107.58	95.39	97.34	93.65	94.57
15	108.36	99.78	112.94	98.26	101.24	105.64	116.87	106.07	95.12	98.53	93.62	94.53
16	108.29	99.07	111.61	100.06	99.96	105.77	117.55	104.64	94.85	98.63	93.61	94.46
17	108.19	100.95	111.29	102.96	98.96	105.75	118.04	103.32	94.66	98.00	93.60	94.36
18	108.06	106.05	110.97	105.16	98.11	105.65	118.49	102.05	94.52	97.29	93.58	94.27
19	107.98	107.79	110.61	106.60	97.75	105.61	118.94	100.76	94.40	96.59	93.56	94.14
20	108.38	108.08	110.18	107.60	97.94	106.70	119.21	99.62	94.30	96.07	93.54	94.06
21	110.69	108.83	109.69	108.32	98.74	107.50	119.28	100.16	94.20	95.94	93.54	93.96
22	111.93	110.39	109.03	108.74	101.34	107.64	119.29	101.41	94.14	95.94	93.52	93.90
23	111.98	111.29	108.17	108.92	104.24	107.78	119.28	101.43	94.09	95.84	93.50	94.30
24	111.88	111.87	107.14	108.91	105.53	107.75	119.18	101.08	94.03	95.60	93.50	95.55
25	111.95	112.40	105.92	108.84	106.34	107.49	119.02	100.86	93.99	95.25	93.50	96.88
26	112.08	112.79	104.69	108.74	107.23	107.25	119.08	100.73	94.00	94.91	93.50	97.24
27	112.18	113.14	103.43	108.65	107.97	107.13	119.04	100.28	94.01	94.65	93.55	97.06
28	112.23	113.53	102.20	108.61	108.60	106.97	118.76	99.60	94.04	94.46	93.54	97.02
29	112.17	.....	101.13	108.62	109.08	106.73	118.42	98.90	94.01	94.24	93.54	96.85
30	111.93	.....	100.20	108.65	109.22	106.41	118.09	98.05	93.97	94.09	93.54	96.81
31	111.51	.....	99.39	.....	109.20	.....	117.83	97.41	.....	94.01	.....	96.98

COLDWATER RIVER AT SAVAGE, MISS.

This station is located at the Yazoo & Mississippi Valley Railroad bridge at Savage, about 5 miles below the place where the river leaves the hills and enters the delta. It was established July 1, 1908, for the purpose of determining the amount of water entering the delta from the foothills and is maintained in cooperation with the Tallahatchie drainage commission.

Although there are large overflow areas along the banks of the river, the flow is practically confined by the railroad embankments to the channel under the bridge and can be conveniently measured at all stages.

The gage, which consists of two vertical sections just below the bridge, is set on sea-level datum so as to read actual elevations. Measurements are made from the downstream side of the bridge.

The following discharge measurement was made by engineers of the Tallahatchie drainage commission:

February 25: Width, 280 feet; area of section, 3,600 square feet; gage height, 184.34 feet; discharge, 6,400 second-feet.

Daily gage height, in feet, of Coldwater River at Savage, Miss., for 1910.

[David J. Hill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	174.7	171.1	184.7	167.0	170.0	178.0	171.9	180.8	166.6	166.0	166.1	169.2
2	170.3	169.9	184.8	167.2	169.5	174.3	174.5	169.3	168.7	166.0	166.1	169.1
3	169.2	169.0	184.8	168.6	168.7	171.4	176.4	174.2	168.7	166.0	166.1	168.3
4	169.0	168.5	184.7	169.9	169.5	169.3	177.3	171.4	170.0	166.0	166.1	168.0
5	168.8	168.2	184.3	171.5	167.7	168.3	178.4	171.0	171.4	166.0	166.1	167.0
6	176.4	168.2	183.8	173.7	167.4	169.3	180.3	171.0	172.3	166.4	166.1	166.5
7	179.8	168.0	183.0	173.8	167.3	171.3	181.0	168.9	170.8	169.7	166.1	166.7
8	181.3	167.9	182.2	173.3	167.3	171.5	182.0	168.4	168.8	170.3	166.1	166.7
9	182.9	167.8	180.6	172.0	167.0	170.0	182.6	168.0	167.5	170.0	166.1	167.0
10	184.2	167.5	178.6	169.7	167.0	171.3	183.9	168.0	166.7	169.8	166.1	167.0
11	184.4	167.5	176.5	169.5	166.9	176.7	182.8	168.0	167.3	168.2	166.1	166.8
12	184.4	167.5	174.1	168.8	166.8	177.5	182.4	169.4	167.0	168.5	166.1	166.7
13	183.7	167.9	172.0	168.5	166.8	179.9	182.0	168.9	164.6	166.9	166.1	166.6
14	183.3	167.7	171.3	168.6	166.8	181.0	181.8	169.8	162.3	169.0	166.1	166.6
15	183.0	167.9	170.0	174.9	166.6	181.7	181.6	169.6	161.1	170.0	166.1	166.6
16	182.3	168.0	169.0	182.0	166.6	182.0	181.4	168.3	161.1	171.8	166.1	166.6
17	181.5	169.1	168.5	186.1	166.8	181.7	181.1	167.2	161.0	173.3	166.1	166.6
18	181.2	172.4	168.1	187.0	167.4	180.9	181.0	166.9	166.0	172.3	166.1	166.6
19	181.2	173.6	167.9	186.7	167.5	179.2	180.7	166.7	166.0	170.0	166.1	166.6
20	180.8	174.2	167.8	186.0	168.0	181.0	179.9	166.5	166.0	169.7	166.1	166.5
21	181.2	178.6	167.8	185.8	170.3	180.6	178.9	167.1	166.0	167.0	166.1	166.5
22	181.4	180.8	167.5	184.7	173.3	179.8	177.6	167.3	166.0	166.8	166.1	166.5
23	181.8	182.0	167.5	184.0	175.0	178.8	174.8	168.5	166.0	166.7	166.1	166.5
24	182.3	183.6	167.6	182.5	176.4	174.1	174.0	167.9	166.0	166.5	166.1	166.6
25	182.4	184.3	167.5	182.0	177.8	173.4	170.2	167.0	166.0	166.3	166.1	166.6
26	182.2	184.3	167.4	180.5	179.4	172.5	172.5	169.0	166.0	166.3	166.1	166.6
27	181.5	184.2	167.3	178.4	180.0	172.2	178.3	170.9	166.0	166.4	166.1	166.5
28	180.0	184.5	167.2	176.3	180.4	171.0	183.2	169.4	166.0	166.2	166.4	167.8
29	177.9	.....	167.0	173.8	180.7	169.8	183.6	168.6	166.0	166.2	166.5	167.8
30	174.9	.....	167.0	175.0	180.6	169.7	183.2	167.5	166.0	166.1	166.5	170.5
31	172.7	.....	166.9	.....	180.0	.....	182.0	166.8	.....	166.1	.....	172.0

Daily discharge, in second-feet, of Coldwater River at Savage, Miss., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,240	607	8,080	230	482	2,180	711	3,390	206	170	176	400
2	515	471	8,870	244	430	1,150	1,190	410	356	170	176	390
3	400	380	8,870	348	356	644	1,680	1,130	356	170	176	324
4	380	340	8,080	471	430	410	1,940	644	482	170	176	300
5	364	316	7,920	357	279	324	2,320	595	644	170	176	230
6	1,680	316	6,970	1,020	258	410	3,140	595	771	194	176	200
7	2,910	300	5,450	1,040	251	631	3,500	372	571	450	176	212
8	3,680	293	4,350	945	251	657	4,180	332	364	515	176	212
9	5,270	286	3,290	725	230	482	4,800	300	251	482	176	230
10	7,730	265	2,400	450	230	631	7,160	300	212	460	176	230
11	8,110	265	1,700	430	224	1,760	5,100	300	251	316	176	218
12	8,110	265	1,110	364	218	2,010	4,550	420	230	340	176	212
13	6,780	293	725	340	218	2,960	4,180	372	104	224	176	206
14	6,020	279	631	348	218	3,500	4,020	460	36	380	176	206
15	5,450	293	482	1,290	206	3,940	3,880	440	21	482	176	206
16	4,440	300	380	4,180	206	4,180	3,740	324	21	697	176	206
17	3,800	390	340	11,300	218	3,940	3,560	244	20	945	176	206
18	3,620	787	308	13,000	258	3,440	3,500	224	170	771	176	206
19	3,620	1,000	293	12,500	265	2,640	3,340	212	170	482	176	206
20	3,390	1,130	286	11,200	300	3,500	2,960	200	170	450	176	200
21	3,620	2,400	286	10,800	515	3,290	2,520	237	170	230	176	200
22	3,740	3,390	265	8,680	945	2,910	2,040	251	170	218	176	200
23	4,020	4,180	265	7,350	1,310	2,480	1,260	340	170	212	176	200
24	4,440	6,590	272	4,660	1,680	1,110	1,080	293	170	200	176	206
25	4,550	7,920	265	4,180	2,110	964	504	230	170	188	176	206
26	4,350	7,920	258	3,240	2,730	803	803	380	170	188	176	206
27	3,800	7,730	251	2,320	3,000	755	2,280	583	170	194	176	200
28	3,000	8,300	244	1,650	3,190	595	5,830	420	170	182	194	286
29	2,140	.....	230	1,040	3,340	460	6,590	348	170	182	200	286
30	1,290	.....	230	1,310	3,290	450	5,830	265	170	176	200	548
31	837	.....	224	.....	3,000	.....	4,180	218	.....	176	.....	725

NOTE.—These discharges were obtained from a rating curve which is fairly well defined between 380 and 5,450 second-feet. Below 380 second-feet the curve is an approximate extension.

Monthly discharge of Coldwater River at Savage, Miss., for 1910.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
January	8,110	364	3,650	B.
February	8,300	265	2,040	B.
March	8,870	224	2,400	B.
April	13,000	230	3,540	B.
May	3,340	206	988	B.
June	4,180	324	1,770	B.
July	7,160	504	3,300	B.
August	3,390	200	478	B.
September	771	20	237	B.
October	945	170	328	B.
November	200	176	178	B.
December	725	200	260	B.
The year	13,000	20	1,600	

YALOBUSHA RIVER AT GRENADA, MISS.

This station, which was established June 14, 1906, for the purpose of obtaining general run-off data, is located in the western part of Grenada at the county highway bridge, about one-half mile from the depot and the same distance below the crossing of the Illinois Central Railroad. It is below the mouth of Bataupan Bogue, which comes

in a short distance above the railroad bridge. The gage chain was stolen a second time on November 2, 1906, and the station was temporarily abandoned. On July 7, 1908, the station was again established in connection with the Tallahatchie drainage commission, using the same gage datum as formerly. The gage is located on the bridge.

The left bank is not liable to overflow. The ground on the right bank is low for a long distance, but is crossed by the public highway embankment, which is above high water except at a few bridged openings.

Conditions are favorable for accurate discharge measurements, which are made from the bridge. It is probable that the station rating will be somewhat affected by backwater from Yazoo River and also by shifting of the stream bed.

The following measurement was made by engineers of the Tallahatchie drainage commission:

February 28: Width, 160 feet; area of section, 2,420 square feet; gage height, 19.52 feet; discharge, 7,320 second-feet.

Daily gage height, in feet, of Yalobusha River at Grenada, Miss., for 1910.

[W. L. Hamby, observer.]

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.0	.....	1.9	1.75	5.0	7.9	3.0	1.75	1.45	1.5	1.5
2	4.1	.....	1.9	1.7	3.8	7.8	2.9	1.7	1.4	1.5	1.5
3	6.4	.....	1.9	1.7	2.5	13.0	2.8	1.65	1.35	1.5	1.5
4	9.4	.....	1.9	1.9	2.2	13.3	2.7	1.65	1.3	1.6	1.5
5	11.0	.....	2.05	1.75	3.1	13.4	2.45	1.8	1.3	1.65	1.5
6	13.4	.....	2.3	1.7	2.4	21.0	2.25	2.1	7.5	1.6	1.8
7	13.6	.....	2.3	1.65	2.0	23.4	6.0	2.05	8.5	1.55	2.0
8	12.1	.....	2.2	1.65	2.0	24.5	6.0	2.0	4.8	1.5	2.4
9	.....	.....	2.05	1.6	2.0	25.7	5.2	1.95	3.7	1.5	2.5
10	.....	.....	2.0	1.6	7.3	25.1	4.2	1.9	3.0	1.5	2.5
11	.....	.....	2.0	1.55	12.1	24.3	4.0	1.85	2.5	1.5	2.35
12	.....	.....	1.95	1.5	11.1	23.6	3.8	1.8	2.1	1.5	2.25
13	.....	3.4	2.0	1.45	9.8	22.7	3.4	1.75	6.0	1.5	2.1
14	.....	3.4	1.95	1.4	8.3	22.0	3.1	1.7	5.8	1.5	2.05
15	.....	3.3	4.0	1.4	7.0	21.0	2.9	1.6	4.2	1.5	2.0
16	.....	3.0	9.1	1.4	5.8	19.5	2.65	1.5	3.1	1.45	1.95
17	.....	2.8	11.1	1.5	4.5	17.7	2.4	1.4	2.9	1.45	1.85
18	.....	2.65	10.1	1.9	3.8	17.0	2.3	1.35	2.6	1.45	1.75
19	.....	2.55	9.0	1.9	3.5	16.3	2.2	1.3	2.3	1.45	1.7
20	.....	2.45	7.4	2.95	10.0	13.3	2.2	1.25	2.3	1.45	1.65
21	.....	2.4	6.4	6.9	12.3	7.8	7.0	1.2	2.8	1.45	5.1
22	.....	2.35	5.0	11.9	8.3	5.4	5.0	1.15	2.2	1.45	7.8
23	.....	2.3	4.1	12.8	5.8	4.2	5.0	1.15	1.8	1.45	7.7
24	.....	2.2	3.4	12.8	5.3	5.0	5.0	1.15	1.7	1.45	7.5
25	.....	2.15	3.0	15.1	6.0	9.8	4.4	1.15	1.6	1.45	7.0
26	.....	2.1	2.6	14.4	7.5	8.9	3.2	1.15	1.5	1.5	6.5
27	.....	2.1	2.35	11.6	5.4	7.1	2.9	1.15	1.5	1.5	5.9
28	.....	2.05	2.05	9.7	6.3	5.4	2.3	1.3	1.5	1.5	5.1
29	.....	2.05	1.95	8.3	7.4	4.6	2.05	1.5	1.5	1.5	4.4
30	.....	1.95	1.85	7.1	7.8	3.9	1.9	1.5	1.5	1.5	4.4
31	.....	1.9	.....	6.0	.....	3.4	1.8	.....	1.5	.....	7.1

Daily discharge, in second-feet, of Yalobusha River at Grenada, Miss., for 1910.

Day.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	465	.....	190	160	1,100	2,300	465	160	102	110	110
2	780	.....	190	150	690	2,250	440	150	95	110	110
3	1,630	.....	190	150	340	5,100	415	140	88	110	110
4	3,120	.....	190	190	265	5,260	390	140	80	130	110
5	4,000	.....	228	160	490	5,320	328	170	80	140	110
6	5,320	.....	290	150	315	10,900	278	240	2,100	130	170
7	5,430	.....	290	140	215	14,100	1,470	228	2,620	120	215
8	4,600	.....	265	140	215	15,800	1,470	215	1,020	110	315
9	.....	.....	228	130	215	17,600	1,160	202	660	110	340
10	.....	.....	215	130	2,020	16,700	815	190	465	110	340
11	.....	.....	215	120	4,600	15,400	750	180	340	110	302
12	.....	.....	202	110	4,060	14,400	690	170	240	110	278
13	.....	570	215	102	3,340	13,100	570	160	1,470	110	240
14	.....	570	202	95	2,520	12,100	490	150	1,390	110	228
15	.....	540	750	95	1,880	10,900	440	130	815	110	215
16	.....	465	2,960	95	1,390	9,260	378	110	490	102	202
17	.....	415	4,060	110	920	7,790	315	95	440	102	180
18	.....	378	3,500	190	690	7,340	290	88	365	102	160
19	.....	352	2,900	190	600	6,920	265	80	290	102	150
20	.....	328	2,060	452	3,450	5,260	265	72	290	102	140
21	.....	315	1,630	1,840	4,720	2,250	1,880	65	415	102	1,130
22	.....	302	1,100	4,500	2,520	1,240	1,100	60	265	102	2,250
23	.....	290	780	4,990	1,390	815	1,100	60	170	102	2,200
24	.....	265	570	4,990	1,200	1,100	1,100	60	150	102	2,100
25	.....	252	465	6,260	1,470	3,340	885	60	130	102	1,880
26	.....	240	365	5,870	2,100	2,840	515	60	110	110	1,670
27	.....	240	302	4,330	1,240	1,920	440	60	110	110	1,430
28	.....	228	228	3,280	1,590	1,240	290	80	110	110	1,130
29	.....	228	202	2,520	2,060	955	228	110	110	110	885
30	.....	202	180	1,920	2,250	720	190	110	110	110	885
31	.....	190	.....	1,470	.....	570	170	.....	110	.....	1,920

NOTE.—These discharges were obtained from a rating curve which is fairly well defined.

Monthly discharge of Yalobusha River at Grenada, Miss., for 1910.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
Jan. 1–8	5,430	465	3,170	A.
Mar. 13–31	570	190	335	B.
April	4,060	180	839	B.
May	6,260	95	1,450	A.
June	4,720	215	1,660	A.
July	17,600	570	6,930	A.
August	1,880	170	632	B.
September	240	60	126	C.
October	2,620	80	491	B.
November	140	102	110	C.
December	2,250	110	694	B.

SUNFLOWER RIVER NEAR RULEVILLE, MISS.

This station, which was established June 15, 1908, and is maintained in cooperation with the Tallahatchie drainage commission, is located at the new iron wagon bridge 3 miles southwest of Ruleville, Miss. The gage was not installed until early in October, 1908, and readings were then intermittent until the end of 1908.

The drainage area above the station is very flat and is cut by a number of small tributaries and bayous. The river at the station

and below has a very small amount of slope, making the current too sluggish for measurements at times. The amount of slope and consequently of velocity varies greatly with the stage of Mississippi River, making it impossible to rate the station in the usual way by basing daily discharges upon the daily gage heights.

As the gage, which consists of two vertical sections below the bridge, is set to sea-level datum, the gage readings are actual elevations above the sea. Measurements are made from the downstream side of the bridge.

Daily gage height, in feet, of Sunflower River near Ruleville, Miss., for 1910.

[W. E. McMathe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	100.50	99.70	104.45	98.60	99.52	99.62	100.00	99.38	98.00	97.00	97.00	97.00
2	100.15	99.60	104.68	98.60	99.42	99.48	100.50	99.28	98.00	97.00	97.00	97.00
3	99.65	99.62	104.75	98.60	99.32	99.25	102.50	99.18	98.00	97.00	97.00	97.00
4	99.35	99.52	104.55	98.60	99.22	99.48	104.35	98.95	98.00	97.00	97.00	97.00
5	100.00	99.42	104.35	99.15	99.12	98.88	105 55	98 78	98.00	97.00	97.00	97.00
6	104.00	99.32	104.10	100.35	98.95	98.78	106.50	98.58	98.00	97.00	97.00	97.00
7	108.10	99.22	103.60	100.75	98.78	98.68	107.85	98.48	98.00	97.00	97.00	97.00
8	109.75	99.12	103.25	100.80	98.62	98.58	109.60	98.38	98.00	97.00	97.00	97.00
9	109.38	98.00	102.45	100.65	98.52	98.48	109.90	98.28	98.00	97.00	97.00	97.00
10	108.10	98.00	101.60	100.55	98.42	98.38	109.50	98.18	98.00	97.00	97.00	97.00
11	106.70	98.00	100.60	100.50	98.32	98.28	109.10	98.05	98.00	97.00	97.00	97.00
12	105.85	98.05	100.25	100.50	98.22	98.32	108.15	98.00	98.00	97.00	97.00	97.00
13	104.70	98.25	100.05	100.50	98.12	98.42	107.20	98.00	97.95	97.00	97.00	97.00
14	103.30	98.38	99.48	100.50	98.00	98.52	106.30	98.00	97.75	97.00	97.00	97.00
15	102.80	98.42	99.82	102.65	98.00	98.65	106.00	98.00	97.55	97.00	97.00	97.00
16	102.05	98.52	99.72	106.00	98.00	98.78	106.00	98.00	97.50	97.00	97.00	97.00
17	101.35	98.60	99.62	107.90	98.00	98.95	105.60	98.00	97.50	97.00	97.00	97.00
18	100.60	98.60	99.52	107.95	98.00	99.00	104.75	98.00	97.38	97.00	97.00	97.00
19	100.60	98.80	99.45	107.25	98.22	99.10	103.75	98.00	97.28	97.00	97.00	97.00
20	101.50	99.60	99.38	106.20	98.35	99.35	102.85	98.00	97.18	97.00	97.00	97.00
21	103.35	100.65	99.28	104.80	98.48	99.40	102.10	98.00	97.05	97 00	97.00	97.00
22	104.15	102.00	99.18	103.85	98.90	99.32	101.45	98.00	97.00	97.00	97.00	97.00
23	104.30	103.90	99.05	103.05	99.50	99.22	100.90	98.00	97.00	97.00	97.00	97.00
24	104.30	104.85	98.92	102.25	99.90	99.12	100.72	98.00	97.00	97.00	97.00	97.00
25	104.30	104.85	98.82	101.10	100.35	99.10	100.58	98.00	97.00	97.00	97.00	97.00
26	103 90	104.65	98.72	100.25	100.80	99.35	100.42	98.00	97.00	97.00	97.00	97.00
27	102.75	104.40	98.62	100.05	100.85	99 55	100 32	98.00	97.00	97.00	97.00	97.00
28	101.90	104.40	98.60	99.85	100.60	99.75	100.22	98.00	97.00	97.00	97.00	97.00
29	101.30	.....	98.60	99.72	100.35	99.42	99.95	98.00	97.00	97.00	97.00	97.00
30	100.45	.....	98.60	99.62	100.10	99.75	99.58	98.00	97.00	97.00	97.00	97.00
31	99.70	.....	98.60	.....	99.75	.....	99.48	98.00	.....	97.00	.....	97.00

SUNFLOWER RIVER AT BAIRD, MISS.

This station, which is located at the Southern Railway bridge, one-half mile west of Baird, Miss., was established June 16, 1908, but the gage was not put in until October 4, 1908. It is maintained in cooperation with the Tallahatchie drainage commission.

Owing to the great variation in height of the outlet of Sunflower River into the Mississippi through the lower portion of Yazoo River and consequently in the slope of Sunflower River, there is no relation whatever between gage heights and discharge at this station.

As the gage, which consists of two vertical sections above the bridge, is set on a sea-level datum, the readings are elevations above sea level. Measurements are from the downstream side of the bridge.

The United States Army engineers have maintained a gage at this station for a portion of the time, and the gage heights prior to October 4, 1908, are from their records corrected to the sea-level datum of the new gage.

Daily gage height, in feet, of Sunflower River at Baird, Miss., for 1910.

[H. V. Finch, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	86.5	90.0	94.1	86.8	86.9	86.0	84.8	86.0	83.3	82.6	82.6	82.6
2	86.1	89.3	93.9	86.3	86.5	85.7	85.5	85.8	83.2	82.6	82.6	82.6
3	85.5	88.6	93.7	85.7	85.9	85.3	86.5	85.7	83.2	82.6	82.6	82.6
4	85.4	88.2	93.4	85.2	85.6	85.0	87.4	85.6	83.1	82.6	82.6	82.7
5	85.3	88.0	93.0	84.8	85.0	84.9	89.8	85.4	83.1	82.6	82.6	82.7
6	87.8	87.6	92.4	84.5	84.8	84.9	91.4	85.4	83.1	82.6	82.6	82.7
7	89.6	87.3	91.8	84.3	84.6	84.6	92.6	85.3	83.2	82.8	82.6	82.7
8	92.0	87.1	91.1	84.3	84.5	84.4	93.7	85.2	83.1	82.8	82.6	82.7
9	93.3	87 0	90 5	84.4	84.4	84.2	94.5	85.0	83.0	82.7	82.6	82.7
10	93.8	86.7	89.9	84.5	84.1	84.2	94.9	85.0	83.0	82.7	82.6	82.7
11	94.0	86.5	89.4	84.5	84.1	84.1	94.9	84.8	82.9	82.7	82.6	82.7
12	93.7	86.3	89.0	84.5	84.0	85.0	94.8	84.6	82.9	82.7	82.6	82.7
13	93.4	85.6	88.6	84.4	84.0	85.1	94.7	84.5	82.9	82.7	82.6	82.7
14	93.0	85.3	88.3	84.3	83.7	85.3	94.3	84.3	82.8	82.7	82.6	82.7
15	92.3	85.2	88.0	84.4	83.6	85.5	93.9	84.1	82.8	82.8	82.6	82.6
16	91.5	85.0	88.0	86.8	83.5	85.3	93.4	84.0	82.8	82.8	82.6	82.6
17	90.8	86.9	87.9	90.4	83.4	85.1	92.8	83.9	82.8	82.8	82.6	82.6
18	90.1	89.6	87.9	92.5	83.4	84.8	92.1	83.8	82.8	82.8	82.6	82.6
19	89.5	90.8	87.8	93.4	83.4	84.5	91.4	83.6	82.8	82.8	82.6	82.6
20	89.0	91.1	87.8	93.5	83.5	84.4	90.7	83.6	82.8	82.8	82.6	82.6
21	91.5	92.0	87.8	93.5	84.0	84.3	89.9	83.5	82.8	82.8	82.6	82.6
22	92.8	93.0	87.9	93.1	84.7	84.2	89.3	83.4	82.7	82.7	82.6	82.6
23	93.7	94.0	88.0	92.7	84.8	84.1	88.6	83.3	82.7	82.7	82.6	82.8
24	94.0	94.5	88.1	92.1	85.1	84.0	88.0	83.4	82.7	82.7	82.6	82.8
25	94.0	94.9	88.1	91.5	85.5	84.3	87.5	83.5	82.7	82.6	82.6	82.8
26	93.7	94.8	88.1	90.7	86.1	84.4	86.9	83.6	82.7	82.6	82.6	82.8
27	93.3	94.6	88.1	89.9	86.7	84.2	86.5	83.6	82.7	82.6	82.6	82.8
28	92.7	94.6	88.1	89.0	86.9	84.4	86.2	83.5	82.7	82.7	82.6	82.8
29	92.0	.....	87.9	88.0	86.8	84.4	85.9	83.5	82.7	82.7	82.6	82.8
30	91.3	.....	87.7	87.5	86.8	84.4	85.6	83.4	82.7	82.6	82.6	83.0
31	90.6	.....	87.3	.....	86.4	.....	85.3	83.3	.....	82.6	.....	83.0

RED RIVER DRAINAGE BASIN.

DESCRIPTION.

Red River is formed by several forks, all of which have their sources in northern Texas, and takes a general easterly direction along the northern boundary of Texas, and then turns toward the southeast, flows through a low swampy region in Louisiana, and enters the Mississippi not far from the southern boundary of the State of Mississippi.

North Fork and Salt Fork rise in the Panhandle of Texas and flow in a general southeasterly direction across the southwest corner of Oklahoma, uniting with Prairie Dog Fork a short distance above

Vernon, Tex. Elm Fork, rising in the same locality, joins North Fork 50 or 75 miles above its mouth. The flow ceases entirely in the late summer and fall in ordinary dry years, and most of the run-off from the basin is flood water from heavy rains. The drainage area consists of dry, semiarid plains varied by sand hills in some portions. The underlying rocks are sandstone, limestone, and gypsum in the upper portion, and granite where the streams pass through the Wichita Mountains.

Wichita River rises in Dickens County, flows northeastward, and joins the Red in Clay County.

Washita River rises in northern Texas, crosses southern Oklahoma and flows into Red River in the southern part of that State, about 10 miles from Denison, Tex.

Sulphur Fork of Red River rises in Hunt and Fanning counties, Tex., flows eastward, forming the boundary between Delta, Red River, and Bowie counties on the north, and Hopkins, Franklin, Titus, Morris, and Cass counties on the south, and joins Red River about 7 miles north of the Louisiana boundary line. The flow of this fork is exceedingly variable; during dry summers it ceases entirely, but enough water always remains standing in pools to water stock; during or immediately after protracted or unusually heavy rains the river becomes very wide and deep, floods its bottoms, and often occasions considerable loss of stock and damage to planters and to the railroads.

WICHITA RIVER AT WICHITA FALLS, TEX.

This station, which is located at the Fort Worth & Denver City Railway bridge at Wichita Falls, Tex., was established in September, 1910, and gage-height observations were begun on October 1, 1910. A standard chain gage was installed on this bridge by R. A. Thompson, chief engineer of the Wichita Falls & Northwestern Railway. Wichita River at this point has a sandy bottom, which shifts from time to time.

Discharge measurements of Wichita River at Wichita Falls, Tex., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 21	J. D. Metcalfe	5.00	1,770
22	do	4.00	809
24	do	2.40	195
Nov. 24	do	1.40	15

Daily gage height, in feet, of Wichita River at Wichita Falls, Tex., for 1910.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	1.1	1.4	1.2	11	1.1	1.2	1.1	21	5.0	1.5	1.6
2	1.1	1.4	1.2	12	1.1	1.2	1.1	22	4.1	1.5	1.6
3	1.0	1.3	1.2	13	1.1	1.2	1.2	23	3.4	1.5	1.5
4	1.0	1.3	1.2	14	1.1	1.2	1.3	24	2.5	1.4	1.5
5	1.0	1.3	1.2	15	1.1	1.2	1.3	25	2.2	1.3	1.5
6	1.0	1.3	1.1	16	1.1	1.4	1.3	26	2.0	1.3	1.4
7	1.0	1.3	1.1	17	1.3	1.4	1.3	27	1.8	1.3	1.4
8	1.0	1.3	1.1	18	1.2	2.2	1.4	28	1.6	1.2	1.4
9	1.0	1.3	1.1	19	1.2	2.0	1.5	29	1.5	1.2	1.3
10	1.1	1.2	1.1	20	1.6	1.8	1.6	30	1.4	1.2	1.3
								31	1.4		1.2

MISCELLANEOUS MEASUREMENTS IN LOWER MISSISSIPPI RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in the lower Mississippi River drainage basin during 1910:

Miscellaneous measurements in lower Mississippi River basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 26	East Fork of Arkansas River.		Leadville, Colo		10.6
Aug. 30	Arkansas River		Boone, Colo		286
Jan. 23	do		La Junta, Colo		635
June 23	do		do		550
Oct. 26	Tennessee Fork of Arkansas River.	Arkansas River	Leadville, Colo		6.6
26	Lake Fork of Arkansas River.	do	do		9.0
May 5	Lake Creek	do	Twin Lakes, Colo		116
July 19	do	do	do		69
June 12	Clear Creek	do	Geibfried's ranch, Colo		236
Sept. 23	Middle Cottonwood Creek.	Cottonwood Creek	1 mile above junction with South Fork near Buena Vista, Colo.		22.6
Feb. 26	Grape Creek	Arkansas River	Canon City, Colo	1.45	38
Apr. 5	do	do	do	1.30	46
30	do	do	do	1.80	124
July 23	do	do	do	1.10	22
Aug. 11	do	do	do	1.38	23
17	do	do	do	1.32	20
Sept. 17	do	do	do		28
Oct. 4	do	do	do		25
28	do	do	do		25
Nov. 24	do	do	do		15
May 31	Oil or Fourmile Creek	do	Headgate Long Gulch Ditch, Colo.		15
31	do	do	End of Garden Park, Colo.		16.5
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Sept. 10	do	do	do		28
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Apr. 2	East Fourmile Creek	Fourmile Creek	At junction with West Fourmile Creek, Colo.		10.9
Mar. 3	North Cheyenne Creek	Fountain Creek	Colorado Springs, Colo		[a] 7
Apr. 22	St. Charles River	Arkansas River	Lime, Colo		148
Dec. 17	Canadian River	do	Maxwell City, N. Mex		[b] 2.5
Oct. 5	Rayado River	Cimarron River	6 miles above station at Abreu's ranch near Cimarron, N. Mex.	[c] 1.72	2.4
Oct. 22	Savoya River	Mora River	La Cueva, N. Mex		[a] 1.0
Dec. 20	Carrizo Creek	Ute Creek	Albert, N. Mex		[b] 25

[a] Estimated.
[b] Estimated. Ice conditions.
[c] Distance of water surface from reference mark, which is lower end of outside, downward projecting point of rock near the upstream end of a vertical rock bank, about 200 yards below the forks of the river.

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 288

SURFACE WATER SUPPLY OF THE UNITED STATES

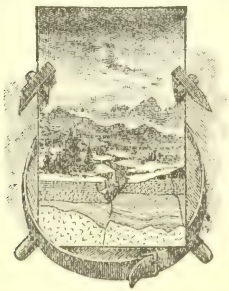
1910

PART VIII. WESTERN GULF OF MEXICO

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. FREEMAN AND J. G. MATHERS



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SURFACE WATER SUPPLY OF WESTERN GULF OF MEXICO, 1910.

By W. B. Freeman and J. G. Mathers.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> Provided that this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structures mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals, the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gauging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the

widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the relation of the results to other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications have varied

greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A.=Annual Report; B.=Bulletin; W S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A., pt 4	Monthly discharge (also for many earlier years)	1898.
W S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt. 4	Monthly discharge	1900.
W S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
W S. 75	Monthly discharge	1901.
W S. 82 to 85	Complete data	1902.
W S. 97 to 100	do	1903.
W S. 124 to 135	do	1904.
W S. 165 to 178	do	1905.
W S. 201 to 214	Complete data, except descriptions	1906.
W S. 241 to 252	Complete data	1907–8.
W S. 261 to 272	do	1909.
W S. 281 to 292	do	1910.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1909. Wherever the data for a drainage basin appears in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910

	1899[a]	1900[b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:											
New England rivers	35	47	65,75	82	97	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	35	47, (48)	65,75	82	97	125	166	202	241	261	281
Susquehanna River to York River, inclusive	35	48	65,75	82	97	126	167	203	241	261	281
James River to Yadkin River, inclusive	(35), 36	48	65,75	(82), 83	(97), 98	126	167	203	242	262	282
Santee River to Pearl River, inclusive	36	48	65,75	83	98	127	168	204	242	262	282
St. Lawrence River	36	49	65,75	(82), 83	97	129	170	206	244	264	284
Hudson Bay	.....	.....	66,75	85	100	130	171	207	245	265	285
Mississippi River:											
Ohio River	36	48, (49)	65,75	83	98	128	169	205	243	263	283
Upper Mississippi River	36	49	65,75	83	98, (99)	128, (130)	171	207	245	265	285
Missouri River	(36), 37	49, (50)	66,75	84	99	130, (131)	172	208	246	266	286
Lower Mississippi River	37	50	(65), 66,75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	37	50	66,75	84	99	132	174	210	248	268	288
Pacific coast and Great Basin											
Colorado River	(37), 38	50	66,75	85	100	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289, (291)
Great Basin	38, (39)	51	66,75	85	100	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290, (291)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66,75	85	100	134	177	213	251	271	291
North Pacific coast	38	51	66,75	85	100	135	(177), 178	214	252	272	292

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35..	James	
36..	Missouri	Gallatin.
37..	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38..	Sacramento	Except Kings and Kern.
39..	Great Basin	Mohave.
48..	Delaware	Wissahickon and Schuylkill.
49..	Ohio	Scioto.
50..	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65..	Lower Mississippi	Yazoo.
82..	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83..	Lower Mississippi	Yazoo.
97..	James	
98..	Lower Mississippi	Do.
99..	Upper Mississippi	Tributaries from the west.
128.	Lower Mississippi	Yazoo.
130.	Upper Mississippi	Tributaries from the west.
131.	Missouri	Platte, Kansas.
134.	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169.	Lower Mississippi	Yazoo.
177.	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205.	Lower Mississippi	Yazoo, Homochitto.
213.	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251.	Colorado	Yuma and Salton Sea stations repeated.
271.	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records for each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in several terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, second-feet per square mile, and run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot

deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents:

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data so far as available are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by

backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on pages 11 and 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of

Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations, indicating the method of suspending the current meter; Plate II shows the various types of current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream flow depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation of discharge to stage. Errors of the second group are due, first, to errors in observation of stage; second, to errors in measurements of flow; and third, to errors due to misinterpretation of stage and flow data.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions, the observers perform their work honestly. The records are, however, closely watched and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. C. E., vol. 66, 1910, p. 70.

it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

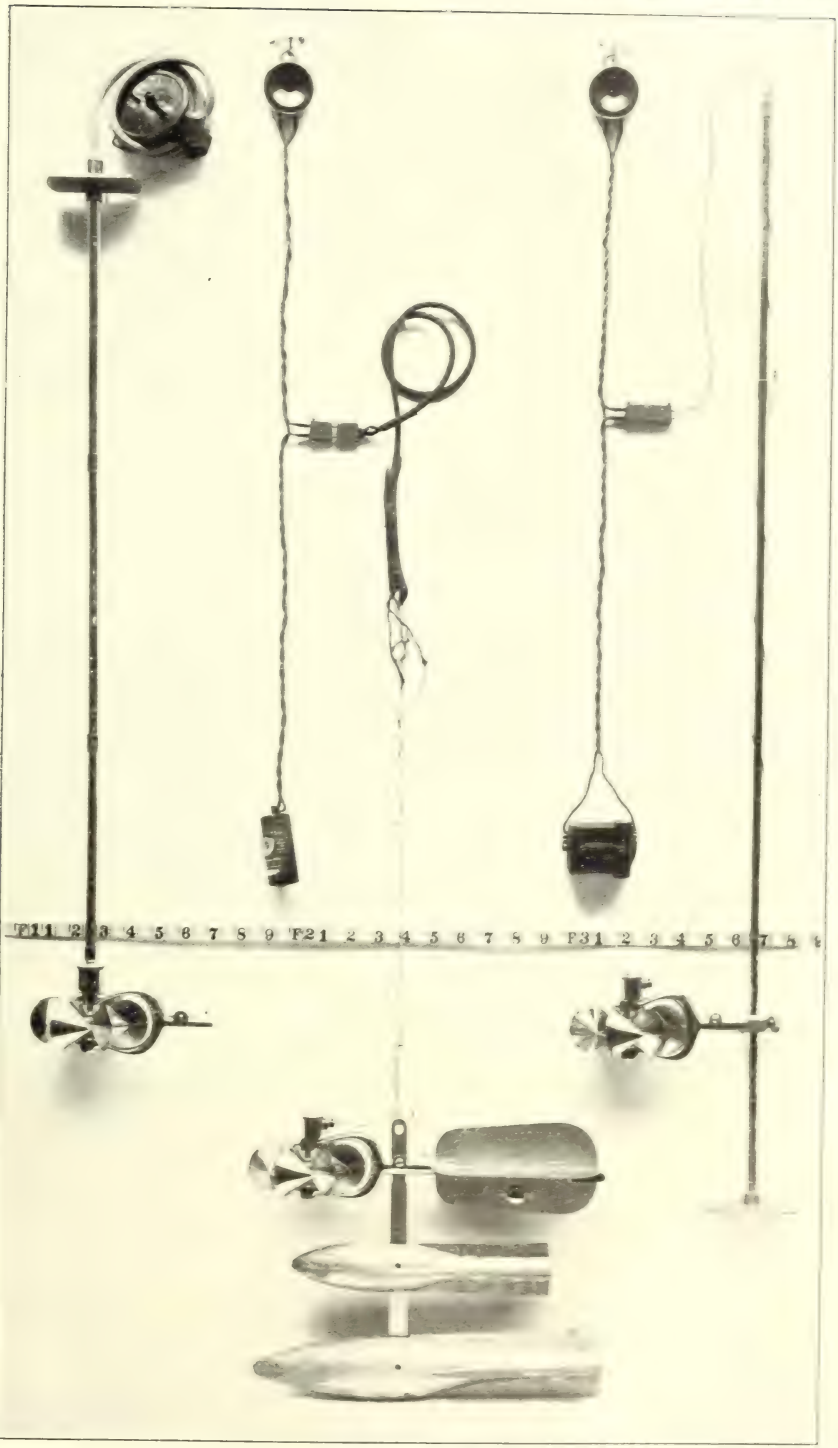
In general the base data which are collected in the field each year by the Survey engineers are published, not only to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station.

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS

and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained by private funds are published in the surface water supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records that are clearly worthless or misleading are not published. As it is, however, impossible to verify completely all such records—for lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgments are due the following:

Vernon L. Sullivan, Territorial engineer of New Mexico, who, by entering into a cooperative contract with the United States Geological Survey, spent a proportionate part of the Territorial stream-gaging fund of $2,500 on work in the Rio Grande drainage basin. Cooperation with the Atchison, Topeka & Santa Fe Railway Company and with several irrigation and power companies, as well as individuals, was also brought about through the Territorial engineer.

The International Water Commission, Gen. Anson Mills, commissioner on the part of the United States; Senor Don Jacobo Blanco, commissioner on the part of Mexico; W. W. Follett, consulting engineer on the part of the United States.

C. W. Comstock, State engineer of Colorado, who has paid the gage observers at most of the Rio Grande stations in Colorado and has materially assisted the work financially and otherwise.

The United States Reclamation Service, for the records on the Pecos at Dayton and Lakewood, New Mexico.

The United States Forest Service, for gage observations furnished by its rangers, and other cooperative assistance.

DIVISION OF WORK.

The field data in Texas except for those stations maintained by the International Water Commission were collected under the direction of T. U. Taylor, district engineer.

The field data in the Rio Grande drainage basin, except for those stations maintained by the International Water Commission, were collected under the direction of W. B. Freeman, district engineer, assisted by James B. Stewart, G. H. Russell, and various engineers of the State engineer's office of Colorado.

The New Mexico work was under the more immediate supervision of Vernon L. Sullivan, Territorial engineer, assisted by C. D. Miller, C. H. Neel, W. W. Mills, and C. B. Digby.

The data furnished by the United States section of the International Water Commission were computed under the direction of W. W. Follett.

The data, ratings, and special studies of the completed data of the stations maintained by the United States Geological Survey were prepared by W. B. Freeman, R. C. Rice, and J. G. Mathers. The computations and the preparation of the completed data for publication were made by G. C. Stevens, R. C. Rice, J. G. Mathers, H. D. Padgett, J. B. Stewart, E. O. Christiansen, G. H. Russell, and J. J. Phelan.

GAGING STATIONS MAINTAINED IN WESTERN GULF OF MEXICO DRAINAGE BASINS.

The following list comprises the gaging stations regularly maintained in western Gulf of Mexico drainage basins by the United States Geological Survey and cooperative parties. Data for these stations have appeared in the published reports as shown in tables on pages 9 and 10. The stations are arranged by river basins and appear in downstream order, tributaries of main streams being indicated by indention. (See p. 11.)

Sabine River basin:
- Sabine River near Longview, Tex., 1904–1906.
- Sabine River at Logansport, La., 1903–1906.
  - Neches River at Evadale, Tex., 1904–1906.

Trinity River basin:
- Trinity River at Dallas, Tex., 1903–1906.
- Trinity River at Riverside, Tex., 1903–1906.

Brazos River basin:
- Brazos River at Waco, Tex., 1898–1910.
- Brazos River at Richmond, Tex., 1903–1906.

Colorado River basin:
- Colorado River at Austin, Tex., 1895–1910.
- Colorado River at Columbus, Tex., 1902–1910.
  - San Saba River near San Saba, Tex., 1904–1906.

Guadalupe River basin:
- Guadalupe River near Cuero, Tex., 1903–1906.

Rio Grande basin:
- Rio Grande at Thirtymile Bridge, near Creede, Colo., 1909–10.
- Rio Grande near Creede (Wason), Colo., 1907–1910.
- Rio Grande near Del Norte, Colo., 1889–1910, except 1907.
- Rio Grande near Lobatos (Cenicero), Colo., 1899–1910.
- Rio Grande near Alamosa, Colo., 1894, 1895, 1903.
- Rio Grande near Embudo, N. Mex., 1889–1903.
- Rio Grande near Buckman, N. Mex. (Rio Grande near Ildefonzo), 1895–1905 and 1909–10.
- Rio Grande near San Marcial, N. Mex., 1895–1910.
- Rio Grande near El Paso, Tex., 1889–1893, 1897–1910.
- Rio Grande near Fort Hancock, Tex., 1900–1903.
- Rio Grande above and below Presidio, Tex., 1900–1910.
- Rio Grande near Langtry, Tex., 1900–1910.
- Rio Grande near Devils River (below mouth), Tex., 1900–1910.
- Rio Grande near Eagle Pass, Tex., 1900–1910.
- Rio Grande near Nuevo Laredo, Tamaulipas, Mexico, 1900–1903.
- Rio Grande near Laredo, Tex., 1903–1910.
- Rio Grande near Roma, Tex., 1900–1910.
- Rio Grande near Brownsville, Tex., 1900–1910.
  - Clear Creek near Creede, Colo., 1910.
  - South Fork of Rio Grande near South Fork, Colo., 1910.
  - San Luis Creek near Villa Grove, Colo., 1910.
    - Saguache River near Saguache, Colo., 1910.
  - Conejos River near Mogote, Colo., 1899, 1900, 1903–1910.
  - Culebra River at San Luis, Colo., 1910.
  - Colorado Creek above Questa, N. Mex., 1910.
  - Colorado Creek below Questa, N. Mex., 1910.
  - Rio Hondo near Arroyo Hondo, N. Mex., 1910.
  - Rio Pueblo de Taos near Taos, N. Mex., 1910.
  - Rio Pueblo de Taos at Los Cordovas, N. Mex., 1910.
    - Rio Lucero near Taos, N. Mex., 1910.
    - Rio Fernando de Taos near Taos, N. Mex., 1910.
  - Chama River near Abiquia, N. Mex., 1895–1897.
  - Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., 1910.
  - Santa Fe Water & Light Co.'s ditch near Santa Fe, N. Mex., 1910.
  - Santa Fe Creek at Santa Fe, N. Mex., 1907–1909.
  - Rio Puerco at Rio Puerco, N. Mex., 1910.
  - Rio Puerco near La Joya, N. Mex., 1910.
    - San Jose River near Suwanee, N. Mex., 1910.
  - Mimbres River near Faywood, N. Mex., 1908–1910.
    - Cameron Creek at Fort Bayard, N. Mex., 1907–1910.
      - Stevens Creek at Fort Bayard, N. Mex., 1907–1910.
  - Rio Tularosa at Mescalero, N. Mex., 1910.
  - Rio La Luz at La Luz, N. Mex., 1910.
  - Pecos River at Cowles, N. Mex., 1910.
  - Pecos River near Anton Chico, N. Mex., 1910.
  - Pecos River at Santa Rosa, N. Mex., 1903–1906, 1910.
  - Pecos River near Fort Sumner, N. Mex., 1904–1910.

Rio Grande basin—Continued.
Pecos River—Continued.
Pecos River near Roswell, N. Mex., 1903–1906.
Pecos River near Dayton, N. Mex., 1905–1910.
Pecos River near Lakewood, N. Mex., 1906–1910.
Pecos River at Avalon, N. Mex., 1906–7.
Pecos River at Carlsbad, N. Mex., 1903–1908.
Pecos River near Pecos, Tex., 1898–1907.
Margueretta flume near Pecos, Tex., 1898, 1900–1908.
Pecos River near Moorhead, Tex., 1900–1910.
Pecos River at High Bridge, near Lozier, Tex., 1898.
Gallinas River near Las Vegas, N. Mex., 1903–1910.
Taylor Moore ditch near Roswell, N. Mex., 1905.
Hondo River below Hondo reservoir, N. Mex., 1903–1906.
Hondo reservoir inlet near Hondo reservoir, N. Mex., 1906–1908.
Hondo reservoir scour gage No. 1 near Hondo reservoir, N. Mex., 1906.
Hondo River near Roswell, N. Mex., 1903–1906.
Rio Ruidoso near Glencoe, N. Mex., 1910.
Penasco River near Dayton, N. Mex., 1905–1908.
Lake McMillan at Lakewood, N. Mex., 1906–7.
Devils River near Devils River, Tex., 1900–1910.
Rio Salado at Guerrero, Tamaulipas, Mexico, 1900–1910.
Rio San Juan at La Quemada, Tamaulipas, Mexico, 1900–1902.
Rio San Juan at Santa Rosalia ranch, Tamaulipas, Mexico, 1902–1910.

BRAZOS RIVER DRAINAGE BASIN.

DESCRIPTION.

Brazos River rises in the Staked Plains in Hale and Lamb counties, western Texas, and takes a general southeasterly course into the Gulf of Mexico, which it enters south of the mouth of Trinity River. Its drainage basin is entirely within the State of Texas.

BRAZOS RIVER AT WACO, TEX.

This station was established September 14, 1898, at the suspension bridge on Bridge Street, Waco, Tex.

A single-span truss bridge crosses the river at an angle of 76° about 300 feet above the suspension bridge.

Discharge measurements are made from the suspension bridge. A boxed chain gage is fastened to the downstream upper chord of the stiffening truss of the suspension bridge.

At low stages the rating curve is not stable on account of the shifting sands. A few hundred feet below the gage sand is taken out of the river for commercial purposes. Between this point and the gage the channel is modified at low stages to direct the current away from or toward certain discharge pipes from factories.

The following measurement was made by T. U. Taylor:

August 25, 1910: Width, 9 feet; area of section, 42 square feet; gage height, 120 feet; discharge, 6 second-feet.

Daily gage height, in feet, of Brazos River at Waco, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907												
1	3.7	3.6	3.2	3.3	2.5	10.6	3.2	4.0	3.1	3.0	4.4	5.4
2	3.8	3.6	3.2	3.8	2.4	9.2	4.8	3.8	3.0	3.0	4.3	5.2
3	3.8	3.5	3.2	3.4	3.5	7.2	6.0	3.8	3.0	3.0	4.2	4.8
4	4.4	3.6	3.4	3.3	4.1	7.4	5.1	3.8	3.0	3.9	4.1	5.0
5	4.0	3.6	3.4	3.2	4.0	6.8	4.5	3.7	3.0	4.1	6.6	4.9
6	4.0	3.6	3.3	3.2	3.7	6.9	4.2	3.6	3.0	9.2	6.1	4.7
7	3.9	3.6	3.2	3.2	3.4	6.5	4.1	3.6	3.0	7.7	5.1	4.5
8	3.8	3.5	3.2	3.1	8.1	6.1	4.0	3.6	3.0	6.4	5.3	4.5
9	3.8	3.6	3.3	3.0	6.9	5.6	4.0	3.5	3.0	8.6	4.9	4.4
10	3.7	3.6	3.1	3.0	6.1	5.1	3.9	4.6	3.0	7.6	5.1	4.4
11	3.7	3.6	3.0	3.0	5.2	4.8	3.7	4.8	2.9	6.6	5.0	4.2
12	3.7	3.5	3.0	2.9	5.1	7.6	4.0	4.6	2.9	7.0	4.8	4.2
13	3.7	3.4	3.0	2.8	5.0	5.0	4.8	4.5	2.9	6.4	4.8	5.0
14	3.7	3.4	3.1	2.8	4.9	4.5	7.6	4.1	2.9	5.5	4.3	5.0
15	3.7	3.4	3.1	2.8	7.8	4.1	11.4	4.1	2.9	5.1	4.2	4.6
16	3.6	3.3	3.0	2.8	6.4	4.0	11.1	4.0	2.9	5.0	4.2	4.4
17	3.6	3.3	3.0	3.0	5.8	3.9	10.8	4.0	2.9	5.0	5.0	4.3
18	3.6	3.3	3.0	2.8	8.8	4.8	10.4	3.8	3.0	5.0	6.5	4.2
19	3.6	3.3	3.0	2.7	6.3	4.8	7.8	3.8	3.0	4.9	6.1	4.2
20	3.6	3.1	2.9	2.7	5.6	4.6	6.9	3.6	3.0	5.2	9.1	4.0
21	3.6	3.1	2.9	2.7	5.5	5.1	6.5	3.5	3.0	4.3	7.1	7.4
22	3.5	3.1	4.1	2.9	5.4	9.6	5.6	3.5	2.9	4.2	7.0	14.8
23	3.5	3.1	4.0	2.9	5.0	6.5	5.4	3.4	3.0	4.1	6.3	12.4
24	3.5	3.1	3.8	2.7	4.7	5.5	5.2	3.4	3.0	4.0	5.8	8.8
25	3.8	3.1	3.8	2.6	4.6	5.8	4.8	3.2	3.0	4.0	5.4	7.1
26	3.7	3.1	3.8	2.5	8.4	7.6	4.6	3.2	3.9	4.0	4.8	6.8
27	3.6	3.1	3.7	2.5	6.1	7.0	5.4	3.2	3.0	6.1	4.8	6.1
28	3.6	3.2	3.5	2.5	5.2	6.2	4.4	3.2	3.0	5.4	4.9	6.0
29	3.6	.....	3.5	2.5	11.1	6.0	4.1	3.2	3.0	4.3	6.1	5.6
30	3.6	.....	3.5	2.5	7.0	5.4	3.9	3.2	3.0	5.2	5.3	5.2
31	3.5	.....	3.4	.....	6.8	.....	4.1	3.1	.....	4.6	.....	5.1
1908												
1	5.0	3.5	3.9	4.4	6.4	10.8	3.3	4.0	4.6	2.5	4.8	2.1
2	4.9	3.6	3.9	4.2	5.8	8.9	3.3	3.4	4.1	2.5	4.2	2.3
3	4.8	3.6	3.9	4.0	5.6	7.8	3.3	3.3	4.0	2.5	3.5	2.4
4	4.8	3.4	3.8	3.9	5.5	9.6	3.5	3.1	3.1	2.4	3.4	3.2
5	4.6	3.7	3.8	4.0	5.3	11.8	3.4	3.0	3.4	2.2	3.0	5.2
6	4.6	4.1	3.8	3.9	5.1	8.1	3.4	2.8	2.5	2.2	2.5	4.4
7	4.8	4.0	3.7	3.9	4.8	6.8	4.1	3.1	3.2	2.1	2.5	4.4
8	4.6	3.8	3.7	3.8	4.6	6.1	4.0	3.2	3.0	4.0	2.5	4.1
9	4.5	5.8	3.7	3.8	4.5	5.6	3.5	3.0	2.8	2.8	2.4	4.0
10	4.5	5.1	4.1	3.7	4.4	5.5	3.8	2.8	2.5	2.2	2.0	3.8
11	4.4	4.3	5.8	3.6	4.3	5.5	3.3	2.8	2.4	2.2	2.0	3.0
12	4.3	6.6	5.6	4.6	4.4	5.2	3.2	3.0	2.6	2.0	1.9	2.8
13	4.2	5.6	5.4	8.1	16.6	5.0	3.2	2.6	3.6	2.6	1.9	2.5
14	4.2	5.4	5.1	10.1	16.8	4.5	3.2	2.6	3.6	2.3	1.6	2.0
15	4.1	5.5	5.0	12.6	7.6	4.4	3.1	2.5	3.2	2.1	1.6	2.3
16	4.0	5.0	4.8	13.6	5.8	4.3	3.5	3.4	3.7	2.0	1.9	2.1
17	4.0	4.8	4.6	11.4	5.2	4.1	3.5	2.6	6.0	1.9	1.5	2.0
18	4.0	4.5	4.5	25.6	19.9	4.1	3.7	2.1	4.8	1.9	1.6	2.0
19	4.0	4.5	4.3	23.0	9.6	4.0	3.0	2.5	4.1	1.8	1.6	1.8
20	3.9	4.4	4.2	32.0	8.1	4.0	3.2	2.5	4.4	1.8	1.5	1.8
21	3.9	4.3	4.1	29.0	7.0	3.8	5.5	2.5	4.6	1.8	1.5	1.7
22	3.9	4.2	4.0	20.5	6.6	3.8	4.3	2.8	4.0	2.0	1.5	1.7
23	3.8	4.1	4.0	19.5	8.0	3.7	4.2	2.5	4.6	2.2	1.4	1.5
24	3.8	4.0	4.3	18.1	13.8	3.6	4.1	2.9	4.8	3.2	1.4	1.5
25	3.8	4.2	4.1	13.4	36.3	3.5	6.1	3.1	4.4	3.0	1.4	1.5
26	3.8	4.1	4.0	11.4	32.1	4.5	5.2	2.8	4.0	2.6	1.4	1.5
27	3.7	4.0	4.0	10.5	30.3	4.0	5.2	2.7	3.8	3.0	1.4	1.5
28	3.6	4.0	4.0	8.5	28.8	3.6	4.6	7.8	3.3	2.9	1.4	1.7
29	3.6	4.0	3.9	7.4	16.1	3.5	4.5	6.4	3.0	5.0	1.5	2.3
30	3.5	.....	3.9	6.5	16.1	3.4	4.3	5.7	3.0	6.1	2.0	2.0
31	3.5	.....	3.8	.....	15.0	.....	5.0	5.1	.....	5.4	.....	2.0

Daily gage height, in feet, of Brazos River at Waco, Tex., for 1907–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909												
1	1.6	1.3	1.4	1.2	1.4	2.9	4.4	1.5	2.7	1.3	3.0	3.9
2	1.5	1.3	1.2	1.2	1.3	4.0	4.8	1.4	2.5	1.3	4.1	16.8
3	1.5	1.3	1.2	1.1	1.3	3.1	4.8	1.4	2.2	1.3	3.1	10.7
4	1.6	1.3	1.1	1.0	1.3	2.8	4.0	1.4	2.2	1.2	2.6	7.8
5	1.4	1.3	1.1	1.0	1.3	2.4	3.5	3.0	3.0	1.2	2.4	8.4
6	1.4	1.2	1.1	1.0	1.4	2.4	3.1	2.5	2.6	1.2	2.3	8.0
7	1.5	1.2	1.2	1.1	1.4	2.3	3.1	2.3	2.0	1.2	2.1	6.4
8	1.5	1.2	1.2	1.2	1.4	2.2	2.8	2.0	1.5	1.2	2.0	6.0
9	1.6	1.1	1.4	1.1	1.3	2.2	2.6	3.1	1.5	3.0	1.9	4.8
10	1.6	1.1	2.6	1.1	1.3	2.0	3.0	6.4	1.5	2.4	1.8	4.0
11	1.6	1.3	1.7	1.1	1.2	1.8	3.0	4.1	2.1	3.6	1.7	3.4
12	1.6	1.4	1.6	1.2	1.2	1.7	2.8	3.6	2.2	3.0	1.7	3.4
13	1.5	1.4	1.6	1.2	1.2	1.6	2.6	3.5	1.9	2.8	1.6	3.4
14	1.5	1.4	1.6	1.2	1.2	1.6	2.5	4.2	1.8	2.6	1.8	3.2
15	1.4	1.4	1.5	1.2	1.2	13.0	2.3	4.6	3.3	2.4	4.2	3.0
16	1.4	1.5	1.5	1.3	1.2	15.0	2.3	7.4	2.2	2.2	3.6	3.0
17	1.4	1.5	1.4	1.2	1.1	12.1	2.2	6.1	1.8	2.1	3.8	2.8
18	1.5	1.4	1.4	1.3	6.6	15.1	2.2	7.4	1.7	1.9	3.4	2.6
19	1.5	1.4	1.4	1.2	5.4	14.1	2.2	6.2	1.7	3.2	3.2	2.4
20	1.5	1.4	1.4	1.2	3.0	8.5	2.0	6.6	1.6	2.6	3.0	2.4
21	1.5	1.3	1.4	1.2	2.4	7.1	1.9	6.5	1.6	2.5	3.0	2.3
22	1.5	1.3	1.3	1.4	4.6	6.0	1.9	5.1	2.2	2.4	3.9	2.2
23	1.5	1.3	1.3	1.4	3.4	5.6	2.2	4.5	1.8	2.1	3.7	2.1
24	1.4	1.3	1.5	1.3	2.6	4.8	2.0	4.0	1.5	2.0	3.4	3.2
25	1.4	1.4	1.5	1.3	2.2	8.5	1.8	3.8	1.5	1.9	3.2	6.6
26	1.4	1.4	1.4	1.3	3.0	5.8	1.7	3.5	1.8	1.9	3.1	4.4
27	1.4	1.4	1.4	2.5	2.4	4.8	1.6	3.2	1.7	3.4	3.0	4.0
28	1.4	1.4	1.3	2.2	2.0	4.4	1.6	3.0	1.5	3.6	3.0	4.0
29	1.3	.....	1.3	1.6	1.8	4.0	1.6	2.8	1.5	3.5	3.0	3.6
30	1.3	.....	1.2	1.5	2.1	4.0	1.5	2.7	1.5	3.1	3.9	3.4
31	1.3	.....	1.2	.....	2.4	.....	1.5	2.5	.....	3.1	.....	3.1
1910												
1	2.6	1.5	1.6	3.0	2.1	3.6	2.2	1.6	1.1	1.4	2.9	0.9
2	2.6	1.8	1.6	3.4	2.1	3.4	2.4	1.5	1.1	1.3	2.8	.8
3	2.4	5.2	1.6	4.2	2.1	3.2	2.1	1.5	1.1	1.3	2.5	.8
4	2.4	3.7	1.5	5.4	2.0	3.1	2.0	1.4	1.0.	1.3	2.4	.8
5	2.3	3.2	1.5	4.0	2.0	4.0	2.2	1.4	1.0	1.3	2.4	.8
6	2.4	2.6	1.5	3.2	1.9	4.2	2.1	1.4	1.4	1.2	2.2	.8
7	2.2	2.1	1.5	4.6	3.2	3.9	2.1	1.4	11.4	1.1	2.1	.7
8	2.2	2.1	1.5	4.2	2.4	3.4	3.6	1.4	5.0	1.1	2.0	.7
9	2.1	1.8	1.5	10.8	2.0	4.4	3.6	1.3	3.2	1.0	2.0	.7
10	2.1	1.8	1.9	8.0	2.0	3.6	2.8	1.3	2.4	1.0	2.0	.7
11	2.0	2.2	2.4	5.4	1.9	3.2	2.7	1.2	2.4	1.0	1.9	.8
12	2.0	1.8	1.8	5.2	1.7	4.8	2.7	1.2	2.0	1.0	1.8	.8
13	2.1	1.8	1.6	5.2	1.6	4.0	2.6	1.2	1.8	1.6	1.8	.9
14	2.2	1.8	1.6	4.2	1.6	4.6	2.6	1.2	1.7	1.4	1.7	.9
15	2.2	1.7	1.5	3.8	1.6	4.2	2.5	1.2	2.4	1.4	1.6	1.0
16	2.2	1.6	1.5	3.1	1.7	3.6	2.2	1.2	3.1	1.2	1.6	1.1
17	2.1	1.6	1.5	2.8	2.7	3.2	2.2	1.2	2.6	1.2	1.6	1.1
18	2.0	1.6	1.5	5.0	14.2	3.0	2.0	1.2	2.5	1.1	1.6	1.1
19	1.9	1.8	1.5	4.6	11.7	2.9	2.0	1.2	2.5	1.0	1.5	1.0
20	2.0	1.9	1.4	4.0	10.7	2.6	1.9	1.4	2.2	1.2	1.3	1.0
21	1.9	1.9	1.4	3.6	8.0	2.4	1.8	1.3	2.0	1.2	1.2	1.0
22	1.8	1.8	1.4	3.4	15.8	2.4	1.8	1.3	1.9	1.2	1.1	1.0
23	1.8	1.7	1.4	3.2	8.7	2.4	1.7	1.2	1.6	1.0	1.1	1.4
24	1.8	1.6	1.4	3.0	5.8	2.3	1.7	1.2	1.6	1.0	1.1	1.4
25	1.8	1.6	1.4	2.7	5.4	2.1	2.2	1.2	1.5	1.4	1.0	1.4
26	1.8	1.6	1.3	2.4	5.0	2.1	2.1	1.1	1.5	4.4	1.0	1.2
27	1.8	1.6	1.3	2.2	4.6	2.6	1.9	1.1	1.4	4.0	1.0	1.2
28	1.7	1.8	1.3	2.2	4.4	3.2	1.8	1.1	1.4	5.4	1.0	1.0
29	1.6	.....	1.3	2.2	4.3	2.6	1.7	1.1	1.5	4.6	1.0	4.4
30	1.5	.....	1.3	2.2	3.8	2.5	1.6	1.1	1.4	3.8	.9	1.6
31	1.5	.....	2.0	.....	3.6	.....	1.6	1.1	.....	3.3	.....	1.6

Daily discharge, in second-feet, of Brazos River at Waco, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	820	740	460	520	208	11,600	460	1,060	410	365	1,410	2,460
2	900	740	460	900	184	8,590	1,800	900	365	365	1,320	2,220
3	900	665	460	590	665	4,960	3,220	900	365	365	1,240	1,800
4	1,410	740	590	520	1,150	5,280	2,120	900	365	980	1,150	2,000
5	1,060	740	590	460	1,060	4,340	1,500	820	365	1,150	4,060	1,900
6	1,060	740	520	460	820	4,500	1,240	740	365	8,590	3,360	1,700
7	980	740	460	460	590	3,910	1,150	740	365	5,780	2,120	1,500
8	900	665	460	410	6,480	3,360	1,060	740	365	3,770	2,340	1,500
9	900	740	520	365	4,500	2,700	1,060	665	365	7,410	1,900	1,410
10	820	740	410	365	3,360	2,120	980	1,600	365	5,600	2,120	1,410
11	820	740	365	365	2,220	1,800	820	1,800	325	4,060	2,000	1,240
12	820	665	365	325	2,120	5,600	1,060	1,600	325	4,640	1,800	1,240
13	820	590	365	290	2,000	2,000	1,800	1,500	325	3,770	1,800	2,000
14	820	590	410	290	1,900	1,500	5,600	1,150	325	2,580	1,320	2,000
15	820	590	410	290	5,940	1,150	13,500	1,150	325	2,120	1,240	1,600
16	740	520	365	290	3,770	1,060	12,700	1,060	325	2,000	1,240	1,410
17	740	520	365	365	2,960	980	12,000	1,060	325	2,000	2,000	1,320
18	740	520	365	290	7,790	1,800	11,100	900	365	2,000	3,910	1,240
19	740	520	365	260	3,630	1,800	5,940	900	365	1,900	3,360	1,240
20	740	410	325	260	2,700	1,600	4,500	740	365	2,220	8,390	1,060
21	740	410	325	260	2,580	2,120	3,910	665	365	1,320	4,800	5,280
22	665	410	1,150	325	2,460	9,410	2,700	665	325	1,240	4,640	22,600
23	665	410	1,060	325	2,000	3,910	2,460	590	365	1,150	3,630	15,900
24	665	410	900	260	1,700	2,580	2,220	590	365	1,060	2,950	7,790
25	900	410	900	234	1,600	2,960	1,800	460	365	1,060	2,460	4,800
26	820	410	900	208	7,030	5,600	1,600	460	980	1,060	1,800	4,340
27	740	410	820	208	3,360	4,640	2,460	460	365	3,360	1,800	3,360
28	740	460	665	208	2,220	3,490	1,410	460	365	2,460	1,900	3,220
29	740	.....	665	208	12,700	3,220	1,150	460	365	1,320	3,360	2,700
30	740	.....	665	208	4,640	2,460	980	460	365	2,220	2,340	2,220
31	665	.....	590	.....	4,340	.....	1,150	410	.....	1,600	.....	2,120
1908.												
1	2,000	665	980	1,410	3,770	12,500	520	1,060	1,600	208	1,800	120
2	1,900	740	980	1,240	2,960	7,990	520	590	1,150	208	1,240	162
3	1,800	740	980	1,060	2,700	5,940	520	520	1,060	208	665	184
4	1,800	590	900	980	2,580	9,410	665	410	410	184	590	460
5	1,600	820	900	1,060	2,340	14,400	590	365	590	140	365	2,220
6	1,600	1,150	900	980	2,120	6,480	590	290	208	140	208	1,410
7	1,800	1,060	820	980	1,800	4,340	1,150	410	460	120	208	1,410
8	1,600	900	820	900	1,600	3,360	1,060	460	365	1,060	208	1,150
9	1,500	2,960	820	900	1,500	2,700	665	365	290	290	184	1,060
10	1,500	2,120	1,150	820	1,410	2,580	900	290	208	140	102	900
11	1,410	1,320	2,960	1,600	1,320	2,580	520	290	184	140	102	365
12	1,320	4,060	2,700	1,600	1,410	2,220	460	365	234	102	86	290
13	1,240	2,700	2,460	6,480	28,400	2,000	460	234	740	234	86	208
14	1,240	2,460	2,120	10,500	29,200	1,500	460	234	740	162	44	102
15	1,150	2,580	2,000	16,400	5,600	1,410	410	208	460	120	44	162
16	1,060	2,000	1,800	19,100	2,960	1,320	665	590	820	102	86	120
17	1,060	1,800	1,600	13,500	2,220	1,150	665	234	3,220	86	34	102
18	1,060	1,500	1,500	68,700	41,000	1,150	820	120	1,800	86	44	102
19	1,060	1,500	1,320	55,200	9,410	1,060	365	208	1,150	70	44	70
20	980	1,410	1,240	105,400	6,480	1,060	460	208	1,410	70	34	70
21	980	1,320	1,150	87,700	4,640	900	2,580	208	1,600	70	34	56
22	980	1,240	1,060	43,600	4,060	900	1,320	290	1,060	102	34	56
23	900	1,150	1,060	39,400	6,300	820	1,240	208	1,600	140	26	34
24	900	1,060	1,320	33,900	19,600	740	1,150	325	1,800	460	26	34
25	900	1,240	1,150	18,500	132,000	665	3,360	410	1,410	365	26	34
26	900	1,150	1,060	13,500	106,000	1,500	2,220	290	1,060	234	26	34
27	820	1,060	1,060	11,400	95,300	1,060	2,220	260	900	365	26	34
28	740	1,060	1,060	7,220	86,600	740	1,600	5,940	520	325	26	56
29	740	1,060	980	5,280	26,700	665	1,500	3,770	365	2,000	34	162
30	665	.....	980	3,910	26,700	590	1,320	2,820	365	3,360	102	102
31	665	.....	900	.....	23,200	.....	2,000	2,120	.....	2,460	.....	102

Daily discharge, in second-feet, of Brazos River at Waco, Tex., for 1907–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	44	20	26	14	26	325	1,410	34	260	20	365	980
2	34	20	14	14	20	1,060	1,800	26	208	20	1,150	29,200
3	34	20	14	10	20	410	1,800	26	140	20	410	11,800
4	44	20	10	8	20	290	1,060	26	140	14	234	5,940
5	26	20	10	8	20	184	665	365	365	14	184	7,030
6	26	14	10	8	26	184	410	208	234	14	162	6,300
7	34	14	14	10	26	162	410	162	102	14	120	3,770
8	34	14	14	14	26	140	290	102	34	14	102	3,220
9	44	10	26	10	20	140	234	410	34	365	86	1,800
10	44	10	234	10	20	102	365	3,770	34	184	70	1,060
11	44	20	56	10	14	70	365	1,150	120	740	56	590
12	44	26	44	14	14	56	290	740	140	365	56	590
13	34	26	44	14	14	44	234	665	86	290	44	590
14	34	26	44	14	14	44	208	1,240	70	234	70	460
15	26	26	34	14	14	17,400	162	1,600	520	184	1,240	365
16	26	34	34	20	14	23,200	162	5,280	140	140	740	365
17	26	34	26	14	10	15,200	140	3,360	70	120	900	290
18	34	26	26	20	4,060	23,500	140	5,280	56	86	590	234
19	34	26	26	14	2,460	20,500	140	3,490	56	460	460	184
20	34	26	26	14	365	7,220	102	4,060	44	234	365	184
21	34	20	26	14	184	4,800	86	3,910	44	208	365	162
22	34	20	20	26	1,600	3,220	86	2,120	140	184	980	140
23	34	20	20	26	590	2,700	140	1,500	70	120	820	140
24	26	20	34	20	234	1,800	102	1,060	34	102	590	410
25	26	26	34	20	140	7,220	70	900	34	86	460	4,060
26	26	26	26	20	365	2,960	56	665	70	86	410	1,410
27	26	26	26	208	184	1,800	44	460	56	590	365	1,060
28	26	26	20	140	102	1,410	44	365	34	740	365	1,060
29	20	.....	20	44	70	1,060	44	290	34	665	365	740
30	20	.....	14	34	120	1,060	34	260	34	410	980	590
31	20	.....	14	.....	184	.....	34	208	.....	410	.....	410
1910.												
1	234	34	44	365	120	740	140	44	10	26	325	6
2	234	70	44	590	120	590	184	34	10	20	290	4
3	184	2,220	44	1,240	120	460	120	34	10	20	208	4
4	184	820	34	2,460	102	410	102	26	8	20	184	4
5	162	460	34	1,060	102	1,060	140	26	8	20	184	4
6	184	234	34	460	86	1,240	120	26	26	14	140	4
7	140	120	34	1,600	460	980	120	26	13,500	10	120	3
8	140	120	34	1,240	184	590	740	26	2,000	10	102	3
9	120	70	34	12,000	102	1,410	740	20	460	8	102	3
10	120	70	86	6,300	102	740	290	20	184	8	102	3
11	102	140	184	2,460	86	460	260	14	184	8	86	4
12	102	70	70	2,220	56	1,800	260	14	102	8	70	4
13	120	70	44	2,220	44	1,060	234	14	70	44	70	6
14	140	70	44	1,240	44	1,600	234	14	56	26	56	6
15	140	56	34	900	44	1,240	208	14	184	26	44	8
16	140	44	34	410	56	740	140	14	410	14	44	10
17	120	44	34	290	260	460	140	14	234	14	44	10
18	102	44	34	2,000	20,800	365	102	14	208	10	44	10
19	86	44	34	1,600	14,200	325	102	14	208	8	34	8
20	102	86	26	1,060	11,800	234	86	26	140	20	20	8
21	86	86	26	740	6,300	184	70	20	102	20	14	8
22	70	70	26	590	25,700	184	70	20	86	20	10	8
23	70	56	26	460	7,600	184	56	14	44	8	10	26
24	70	44	26	365	2,960	162	56	14	44	8	10	26
25	70	44	26	260	2,460	120	140	14	34	26	8	26
26	70	44	20	184	2,000	120	120	10	34	1,410	8	14
27	70	44	20	140	1,600	234	86	10	26	1,060	8	14
28	56	70	20	140	1,410	460	70	10	26	2,460	8	8
29	44	.....	20	140	1,320	234	56	10	34	1,600	8	1,410
30	34	.....	20	140	900	208	44	10	26	900	6	44
31	34	.....	102	.....	740	.....	44	10	.....	520	.....	44

Monthly discharge of Brazos River near Waco, Tex., for 1907–1910.

[Drainage area, 30,800 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1907.						
January	1,410	665	827	0.027	0.03	50,800
February	740	410	580	.019	.02	32,200
March	1,150	325	557	.018	.02	34,200
April	900	208	351	.011	.01	20,900
May	12,700	184	2,810	.091	.10	173,000
June	11,600	980	3,670	.119	.13	218,000
July	13,500	460	3,400	.110	.13	209,000
August	1,800	410	858	.028	.03	52,800
September	980	325	376	.012	.01	22,400
October	8,590	365	2,560	.083	.10	157,000
November	8,390	1,150	2,590	.084	.09	154,000
December	22,600	1,060	3,440	.112	.13	212,000
The year	22,600	184	1,850	.060	.80	1,340,000
1908.						
January	2,000	665	1,220	.040	.05	75,000
February	4,060	590	1,500	.049	.05	86,300
March	2,960	820	1,310	.043	.05	80,600
April	105,400	820	19,100	.620	.69	1,140,000
May	132,000	1,320	22,000	.714	.82	1,350,000
June	14,400	590	3,120	.101	.11	186,000
July	3,360	460	1,060	.034	.04	65,200
August	5,940	120	777	.025	.03	47,800
September	3,220	184	926	.030	.03	55,100
October	3,360	70	444	.014	.02	27,300
November	1,800	26	218	.0071	.008	13,000
December	2,220	34	365	.012	.01	22,400
The year	132,000	26	4,340	.140	1.91	3,150,000
1909.						
January	44	20	32.0	.0010	.001	1,970
February	34	10	22.0	.00071	.0007	1,220
March	234	10	31.8	.0010	.001	1,960
April	208	8	26.9	.00087	.001	1,600
May	4,060	10	354	.011	.01	21,800
June	23,500	44	4,610	.150	.17	274,000
July	1,800	34	359	.0121	.01	22,100
August	5,280	26	1,410	.046	.05	86,700
September	520	34	113	.0037	.004	6,720
October	740	14	230	.0075	.009	14,100
November	1,240	44	437	.014	.02	26,000
December	29,200	140	2,750	.089	.10	169,000
The year	29,200	10	866	.028	.38	627,000
1910.						
January	234	34	114	.0037	.004	7,010
February	2,220	34	191	.0062	.006	10,600
March	184	20	41.7	.0014	.002	2,560
April	12,000	140	1,420	.046	.05	84,500
May	25,700	44	3,290	.107	.12	202,000
June	1,800	120	620	.020	.02	36,900
July	740	44	170	.0055	.006	10,500
August	44	10	18.6	.00060	.0007	1,140
September	13,500	8	616	.020	.02	36,700
October	2,460	8	270	.0088	.01	16,600
November	325	6	78.6	.0026	.003	4,680
December	1,410	3	56.1	.0018	.002	3,450
The year	25,700	3	576	.019	.24	417,000

NOTE.—The measurement made in 1910 is the only one since 1905. The estimates for 1907–1910, therefore, may be somewhat in error.

COLORADO RIVER (OF TEXAS) DRAINAGE BASIN.

DESCRIPTION.

Colorado River rises in the extreme western portion of the State, within a few miles of the eastern boundary of New Mexico, and flows in a general southeasterly direction, emptying into the Gulf of Mexico, in Matagorda County. The drainage area, comprising 40,000 square miles above Columbus, extends into the corner of New Mexico. The principal tributaries of the Colorado are the Concho, the San Saba, and the Llano. The Concho carries a greater quantity of water than the Colorado at their point of junction, furnishes water for irrigation and water power, and supports in Irion and Tom Green counties some excellent irrigation systems.[1]

The Colorado at Austin emerges from a canyon; from Austin to the Gulf it traverses a rather flat country, and its waters are utilized for many power plants. A large acreage of rice is irrigated by canals that obtain their water from the Colorado.

COLORADO RIVER AT AUSTIN, TEX.

This station, which was established December 21, 1897, was originally located at the dam near Austin, Tex. Gage heights were first obtained on the crest of the Austin dam August 13, 1895, and were continued from that date until the failure of the dam in April, 1900. On the failure of the dam the station was moved to the Congress Avenue Bridge, south of the city.

A staff gage consisting of upright posts driven into the bank of the river is located near the bathhouse about 150 feet above the bridge; for higher stage the first pier from the north has been marked up to 21.00 feet; for stages above 21.00 feet a chain gage is used.

The low-water level at this point has been gradually falling for several years. This decrease has been caused by the erosion of the channel about 200 yards below the highway bridge. Under the highway bridge the water spreads out into a large pool, the outlet of which is through two contracted sections below, the main one being that in which the erosion has taken place. The lowest level recorded from gage observations is 0.45 foot, on August 15–20, 1910.

[1] Water-Supply Paper U. S. Geol. Survey No. 71, 1902. San Saba and Llano rivers are described in the same paper.

Discharge measurements of Colorado River at Austin, Tex., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 15	T. U. Taylor	0.44	41
Aug. 16	do	.44	41
16[a]	do	.44	20
16[a]	J. W. Calhoun	.44	20
Aug. 17	T. U. Taylor	.44	20
17[a]	do	.44	19
Aug. 18[b]	do	.44	24
18[c]	do	.44	19
Aug. 20	do	.44	35
Sept. 5	do	.70	93
Sept. 9	do	9.85	26,700
9	do	8.60	22,300
Sept. 10	do	5.80	16,800
10	do	5.10	8,200

[a] Made at the dam site. [b] Made at Kingsland. [c] Made at Marble Falls.

NOTE.—From Aug. 15 to Sept. 10 the flow of Barton's springs at Austin was 19 second-feet. If this amount be added to the discharges at the dam site and the falls (Aug. 16–18) it will give the discharges at the bridge for those days.

Daily gage height, in feet, of Colorado River at Austin, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.3	1.1	1.2	1.7	0.8	5.5	2.0	1.3	0.7	1.7	2.3	1.5
2	1.3	1.1	1.2	1.5	1.0	3.4	1.8	1.3	.7	1.6	1.9	1.4
3	1.2	1.1	1.2	1.2	1.0	2.5	1.8	1.2	.7	1.7	1.9	1.4
4	1.2	1.1	1.2	.9	1.2	2.4	1.8	1.2	.6	1.7	1.9	1.4
5	1.2	1.1	1.2	.9	1.5	2.0	3.8	1.2	.6	1.8	1.8	1.5
6	1.1	1.1	1.1	.9	2.0	1.8	2.9	1.2	.6	2.9	1.9	1.7
7	1.1	1.1	1.1	.8	2.4	1.8	2.2	2.1	.6	6.5	2.0	1.7
8	1.2	1.1	1.1	.7	3.2	1.9	2.0	2.0	.5	5.7	2.1	1.8
9	1.2	1.1	1.0	.7	3.4	1.9	1.9	2.0	.5	8.3	3.6	1.8
10	1.1	1.2	1.0	.65	4.1	1.8	1.8	1.8	.6	6.9	3.5	1.8
11	1.1	1.2	1.0	.65	3.8	1.8	1.8	1.5	.6	5.5	3.0	1.8
12	1.1	1.1	1.0	.65	3.1	1.6	1.8	1.3	.6	4.8	2.6	1.9
13	1.1	1.1	1.0	.65	3.0	1.5	1.9	1.3	.5	3.5	2.5	1.9
14	1.0	1.1	1.0	.65	2.7	1.4	10.1	1.2	.5	2.7	2.3	2.4
15	1.0	1.1	1.1	.65	2.2	1.3	7.8	1.1	.6	1.9	2.2	2.5
16	.9	1.1	1.1	.65	1.8	1.2	6.7	1.1	.6	1.9	2.1	2.5
17	.8	1.1	1.1	.9	1.6	1.2	6.5	1.0	.5	2.4	4.3	2.6
18	1.1	1.1	1.0	.7	1.5	1.1	7.3	1.0	.5	3.7	4.2	2.6
19	1.1	1.1	1.0	.7	1.5	1.0	7.2	.9	.5	2.8	9.9	2.4
20	1.1	1.1	1.0	.7	1.4	1.0	5.4	.9	.5	2.7	5.4	2.4
21	1.0	1.1	.9	.9	1.4	1.0	4.3	.9	.6	3.4	5.3	2.5
22	1.0	1.1	.9	1.0	1.6	1.1	3.8	.9	.6	2.8	5.3	2.8
23	1.0	1.1	1.0	1.1	1.6	7.6	2.2	.8	.7	2.5	5.0	2.9
24	1.0	1.1	1.0	1.0	1.8	7.7	2.1	.8	.8	2.4	4.9	2.8
25	1.0	1.1	1.0	.8	2.1	6.2	1.9	.8	.8	2.3	4.5	2.6
26	1.0	1.1	1.0	.7	2.5	5.9	1.9	.7	1.8	2.0	3.8	2.5
27	1.1	1.2	1.0	.7	5.4	4.1	1.8	.7	1.8	1.9	3.1	2.6
28	1.1	1.2	1.0	.7	5.5	3.3	1.6	.8	1.7	1.7	3.0	2.4
29	1.1	.....	1.0	.7	10.2	2.9	1.5	.7	1.7	1.8	2.9	2.2
30	1.1	.....	1.1	.7	6.6	2.2	1.5	.6	1.7	1.9	2.8	1.9
31	1.1	.....	1.1	.....	6.6	.....	1.4	.6	.....	2.0	.....	1.8
1908.												
1	1.7	1.4	1.8	1.5	2.4	4.8	2.2	1.7	2.0	2.0	2.0	1.4
2	1.7	1.3	1.7	1.3	2.4	4.5	2.2	1.6	1.5	1.9	1.9	1.5
3	1.5	1.3	1.6	1.2	2.4	4.0	2.2	1.5	1.5	1.8	1.8	1.5
4	1.5	1.4	1.6	1.4	2.3	3.8	2.2	1.4	1.5	1.7	1.8	1.5
5	2.1	1.5	1.5	1.3	2.3	3.7	3.5	2.0	1.5	1.6	1.8	3.0
6	2.4	1.3	1.5	1.3	2.2	3.6	3.0	2.5	1.5	1.6	1.7	2.7
7	2.5	1.3	1.4	1.3	2.1	3.5	4.5	3.0	1.5	2.0	1.4	2.0
8	2.5	1.3	1.5	1.2	2.1	3.4	3.5	3.7	1.7	2.4	1.5	1.9
9	2.1	2.4	1.4	1.1	2.0	3.3	3.1	5.0	1.6	2.5	1.5	1.8
10	1.9	3.1	1.5	1.0	2.0	3.2	4.4	5.2	2.2	2.6	1.4	1.8

Daily gage height, in feet, of Colorado River at Austin, Tex., for 1907–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	1.9	3.4	2.8	1.1	2.0	3.1	5.1	3.5	2.3	2.5	1.4	1.8
12	1.8	3.5	2.8	1.1	1.9	3.0	4.4	3.0	2.4	2.2	1.4	1.7
13	1.8	2.5	2.1	1.3	1.8	2.9	3.7	3.0	2.4	2.0	1.3	1.7
14	1.6	2.4	1.6	1.4	1.7	2.8	3.3	2.5	2.5	1.7	1.3	1.7
15	1.6	2.2	2.3	3.5	5.6	2.7	3.0	2.4	2.6	1.6	1.3	1.6
16	1.4	2.4	2.1	2.8	3.8	2.6	2.7	2.1	2.6	1.6	1.2	1.6
17	1.4	2.4	1.9	3.6	2.9	2.5	2.6	2.0	2.6	1.5	1.2	1.6
18	1.4	2.1	1.8	3.0	2.5	2.4	2.5	2.0	2.5	1.4	1.2	1.6
19	1.3	2.0	1.8	5.2	3.0	2.3	2.4	2.0	4.0	1.4	1.2	1.6
20	1.2	2.0	1.6	8.8	10.0	2.2	2.4	2.0	4.5	1.4	1.2	1.6
21	1.2	1.8	1.6	12.1	11.1	2.1	2.3	1.9	4.6	1.4	1.2	1.6
22	1.2	1.8	1.7	16.0	6.0	2.0	2.2	1.8	4.2	1.5	1.2	1.5
23	1.2	1.8	1.9	21.6	4.0	1.8	2.1	1.8	3.0	1.5	1.2	1.5
24	1.3	1.8	1.6	18.5	7.4	1.8	2.0	1.7	3.0	1.5	1.2	1.5
25	1.2	1.8	1.6	8.3	17.0	1.8	2.0	1.6	2.8	4.8	1.2	1.5
26	1.3	1.9	1.6	5.0	12.2	1.8	2.0	2.1	2.7	4.0	1.2	1.4
27	1.5	1.9	1.6	3.0	13.0	1.8	2.0	2.4	2.6	3.8	1.2	1.4
28	1.5	1.8	1.5	2.5	13.7	1.8	2.0	2.6	2.5	3.0	1.2	1.4
29	1.4	1.8	1.5	2.4	9.2	2.4	2.0	2.5	2.0	2.8	1.2	1.5
30	1.4	.....	1.5	2.4	7.0	2.4	1.9	2.4	2.0	2.4	1.4	1.6
31	1.3	.....	1.4	.....	5.1	.....	1.8	2.0	.....	2.2	.....	1.6
1909.												
1	1.6	1.3	.9	.9	3.1	4.9	2.3	3.6	1.9	2.5	2.7	1.8
2	1.6	1.3	.9	1.2	2.9	5.4	2.3	3.3	1.8	2.3	2.5	1.8
3	1.6	1.3	.9	1.2	2.8	6.8	2.5	2.9	1.4	2.3	2.5	3.3
4	1.6	1.3	.9	1.3	2.7	10.6	2.4	2.6	1.4	2.2	2.5	5.7
5	1.6	1.2	.9	1.3	2.5	5.7	2.2	2.4	1.3	2.2	2.4	6.0
6	1.5	1.2	.9	1.2	2.5	4.6	2.3	2.3	1.2	1.9	2.3	5.2
7	1.4	1.1	1.0	1.2	2.6	3.8	2.1	2.3	1.4	1.8	2.4	4.6
8	1.4	1.1	.9	1.3	2.7	3.6	2.0	2.4	1.4	1.8	2.3	3.3
9	1.4	1.1	1.2	1.3	2.4	3.2	1.8	2.4	1.3	1.8	2.3	3.2
10	1.4	1.0	1.2	1.2	2.3	3.0	2.2	2.2	1.3	1.9	2.2	2.6
11	1.4	1.1	1.1	1.2	2.1	3.0	2.1	2.3	1.3	2.3	2.2	2.5
12	1.3	1.1	1.1	1.2	2.1	2.8	1.9	2.5	1.2	2.2	2.2	2.5
13	1.3	1.1	1.2	1.2	1.9	2.5	1.9	2.5	1.2	1.8	1.8	2.6
14	1.3	1.3	1.1	1.3	1.8	2.3	1.7	2.6	1.3	1.7	2.5	2.2
15	1.3	1.5	1.1	1.2	2.5	2.4	1.8	2.4	1.3	1.7	1.5	2.0
16	1.3	1.4	1.0	1.1	1.9	2.1	1.5	2.1	1.2	1.6	1.7	2.0
17	1.3	1.3	1.0	1.1	2.3	2.1	1.5	2.3	4.4	1.6	1.6	1.8
18	1.3	1.3	1.0	1.0	2.4	3.6	1.7	2.6	3.1	1.6	1.6	2.2
19	1.3	1.2	1.0	.9	2.9	3.4	1.9	2.8	2.9	2.2	1.5	2.0
20	1.4	1.2	1.0	.9	2.8	4.7	1.6	3.3	3.0	4.8	1.5	2.0
21	1.3	1.1	.9	1.0	2.6	3.5	1.3	2.9	2.8	3.4	1.6	1.8
22	1.3	1.1	.9	1.0	2.5	2.9	1.3	2.6	3.0	5.6	1.5	1.8
23	1.3	1.1	.9	1.1	2.5	2.7	1.5	2.2	3.2	5.8	1.5	2.3
24	1.2	1.1	.9	.9	2.7	2.4	10.3	2.1	2.8	5.2	1.7	2.2
25	1.2	1.1	1.1	.8	2.6	2.3	9.1	2.1	2.8	4.7	1.6	2.2
26	1.2	1.0	1.2	.8	6.8	3.1	5.2	2.1	2.8	4.1	1.6	2.3
27	1.4	.9	1.1	1.0	7.6	3.7	4.5	2.0	2.8	4.0	1.5	2.3
28	1.3	.9	1.1	1.1	5.9	4.0	4.2	1.8	2.6	3.8	1.5	2.0
29	1.3	.....	1.0	2.3	6.7	3.4	4.6	1.8	2.8	3.7	1.8	1.8
30	1.5	.....	.9	3.5	3.8	2.9	4.1	2.0	2.7	3.0	1.9	1.7
31	1.4	.....	.9	.....	3.7	.....	4.0	1.9	.....	2.7	.....	1.6
1910.												
1	1.6	1.5	1.3	7.6	1.5	1.7	.7	1.1	1.1	.55	1.40	.9
2	1.6	1.7	1.3	5.7	1.5	1.6	.7	1.1	1.0	.55	1.3	.9
3	1.6	1.6	1.3	5.0	1.4	1.5	1.2	1.0	.9	.55	1.3	.9
4	1.5	1.6	1.2	4.4	1.4	1.4	.9	1.0	.8	1.0	1.3	1.0
5	1.5	1.5	1.1	3.4	1.3	1.4	.8	1.0	.7	2.0	1.2	1.0
6	1.5	1.6	1.1	3.0	1.3	1.3	3.3	1.0	1.1	1.8	1.1	.9
7	1.3	1.6	1.0	3.2	1.3	1.4	2.2	.55	.65	1.6	1.0	.8
8	1.3	1.6	1.0	3.0	1.3	1.4	2.0	.45	.65	1.4	1.0	.8
9	1.3	1.6	1.0	3.1	1.3	1.4	1.8	.45	10.00	1.4	.9	.8
10	1.2	1.5	1.1	7.6	1.3	1.3	1.7	.45	5.8	1.4	.9	.8
11	1.2	1.5	1.1	5.5	1.3	1.2	1.6	.45	3.8	1.4	.9	.8
12	1.1	1.5	1.2	5.0	1.3	1.2	1.6	.45	3.0	1.5	.9	.8
13	1.1	1.5	1.1	4.8	2.0	1.2	1.5	.45	2.5	1.6	.9	.8
14	1.4	1.5	1.2	4.5	2.0	1.2	1.4	.45	2.0	1.5	.8	.8
15	1.3	1.5	1.2	2.9	1.8	1.2	1.4	.45	2.0	1.5	.8	1.0

Daily gage height, in feet, of Colorado River at Austin, Tex., for 1907–1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	1.2	1.5	1.1	2.6	1.7	1.2	1.4	.45	1.6	1.4	.8	1.0
17	1.2	1.5	1.2	2.4	1.8	1.2	1.3	.45	1.7	1.4	.9	1.1
18	1.3	1.5	1.3	2.2	1.7	1.2	1.2	.45	1.6	1.3	1.0	1.0
19	1.2	1.5	1.3	2.1	4.8	1.1	1.2	.45	1.5	1.3	1.0	1.0
20	1.2	1.5	1.3	2.0	5.3	1.0	1.2	.45	1.5	1.4	1.2	1.0
21	1.2	1.4	1.3	2.0	7.0	1.0	1.7	.45	1.5	1.4	1.1	1.0
22	1.1	1.4	1.3	1.9	6.0	.65	1.5	.45	1.4	1.4	1.1	1.2
23	1.2	1.5	1.3	1.9	4.1	.65	1.4	.45	1.4	1.3	1.0	1.8
24	1.0	1.5	1.3	1.9	3.3	.65	1.4	.55	1.4	1.3	1.0	1.8
25	1.0	1.3	1.3	1.8	2.6	.55	1.3	.55	1.3	1.4	1.0	1.8
26	1.1	1.3	1.3	1.7	2.4	.55	1.5	1.0	1.3	3.3	1.0	1.6
27	1.1	1.3	1.3	1.6	2.1	.55	1.4	1.6	1.0	2.6	1.0	1.5
28	1.1	1.4	1.2	1.6	2.0	.55	1.4	1.5	.65	2.0	.9	1.4
29	1.0	.....	1.2	1.6	1.9	.55	1.3	1.4	.65	1.8	.9	1.4
30	1.4	.....	1.2	1.6	1.9	.55	1.3	1.3	.55	1.6	.9	1.3
31	1.4	.....	1.1	.....	1.8	.....	1.2	1.3	.....	1.6	.....	1.1

Daily discharge, in second-feet, of Colorado River at Austin, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	306	219	260	543	123	9,820	760	306	96	543	1,030	418
2	306	219	260	418	183	2,880	613	306	96	478	685	359
3	260	219	260	260	183	1,260	613	260	96	543	685	359
4	260	219	260	152	260	1,140	613	260	72	543	685	359
5	260	219	260	152	418	760	3,870	260	72	613	613	418
6	219	219	219	152	760	613	1,840	260	72	1,840	685	543
7	219	219	219	123	1,140	613	930	840	72	13,700	760	543
8	260	219	219	96	2,430	685	760	760	50	10,600	840	613
9	260	219	183	96	2,880	685	685	760	50	20,700	3,360	613
10	219	260	183	84	4,660	613	613	613	72	15,300	3,120	613
11	219	260	183	84	3,870	613	613	418	72	9,820	2,020	613
12	219	219	183	84	2,220	478	613	306	72	7,080	1,390	685
13	219	219	183	84	2,020	418	685	306	50	3,120	1,260	685
14	183	219	183	84	1,530	359	27,800	260	50	1,530	1,030	1,140
15	183	219	219	84	930	306	18,800	219	72	685	930	1,260
16	152	219	219	84	613	260	14,500	219	72	685	840	1,260
17	123	219	219	152	478	260	13,700	183	50	1,140	5,260	1,390
18	219	219	183	96	418	219	16,800	183	50	3,620	4,960	1,390
19	219	219	183	96	418	183	16,400	152	50	1,680	27,000	1,140
20	219	219	183	96	359	183	9,420	152	50	1,530	9,420	1,140
21	183	219	152	152	359	183	5,260	152	72	2,880	9,040	1,260
22	183	219	152	183	478	219	3,870	152	72	1,680	9,040	1,680
23	183	219	183	219	478	18,000	930	123	96	1,260	7,860	1,840
24	183	219	183	183	613	18,400	840	123	123	1,140	7,480	1,680
25	183	219	183	123	840	12,500	685	123	123	1,030	5,940	1,390
26	183	219	183	96	1,260	11,400	685	96	613	760	3,870	1,260
27	219	260	183	96	9,420	4,660	613	96	613	685	2,220	1,390
28	219	260	183	96	9,820	2,650	478	123	543	543	2,020	1,140
29	219	.....	183	96	28,100	1,840	418	96	543	613	1,840	930
30	219	.....	219	96	14,100	930	418	72	543	685	1,680	685
31	219	.....	219	.....	14,100	.....	359	72	.....	760	.....	613
1908.												
1	543	359	613	418	1,140	7,090	930	543	760	760	760	359
2	543	306	543	306	1,140	5,950	930	478	418	685	685	418
3	418	306	478	260	1,140	4,400	930	418	418	613	613	418
4	418	359	478	359	1,030	3,870	930	359	418	543	613	418
5	840	418	418	306	1,030	3,620	3,120	760	418	478	613	2,020
6	1,140	306	418	306	930	3,360	2,020	1,260	418	478	543	1,530
7	1,260	306	359	306	840	3,120	5,940	2,020	418	760	359	760
8	1,260	306	418	260	840	2,880	3,120	3,620	543	1,140	418	685
9	840	1,140	359	219	760	2,650	2,220	7,860	478	1,260	418	613
10	685	2,220	418	183	760	2,430	5,600	8,640	930	1,390	359	613
11	685	2,880	1,680	219	760	2,220	8,260	3,120	1,030	1,260	359	613
12	613	3,120	1,680	219	685	2,020	5,600	2,020	1,140	930	359	543
13	613	1,260	840	306	613	1,840	3,620	2,020	1,140	760	306	543
14	478	1,140	478	359	543	1,680	2,650	1,260	1,260	543	306	543
15	478	930	1,030	3,120	10,200	1,530	2,020	1,140	1,390	478	306	478
16	359	1,140	840	1,680	3,870	1,390	1,530	840	1,390	478	260	478
17	359	1,140	685	3,360	1,840	1,260	1,390	760	1,390	418	260	478
18	359	840	613	2,020	1,260	1,140	1,260	760	1,260	359	260	478
19	306	760	613	8,640	2,020	1,030	1,140	760	4,460	359	260	478
20	260	760	478	22,700	27,400	930	1,140	760	5,940	359	260	478

Daily discharge, in second-feet, of Colorado River at Austin, Tex., for 1907–1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	260	613	478	35,600	31,700	840	1,030	685	6,320	359	260	478
22	260	613	543	50,800	11,800	760	930	613	4,960	418	260	418
23	260	613	685	72,600	4,400	613	840	613	2,020	418	260	418
24	306	613	478	60,500	17,200	613	760	543	2,020	418	260	418
25	260	613	478	20,700	54,700	613	760	478	1,680	7,080	260	418
26	306	685	478	7,860	35,900	613	760	840	1,530	4,400	260	359
27	418	685	478	2,020	39,100	613	760	1,140	1,390	3,870	260	359
28	418	613	418	1,260	41,800	613	760	1,390	1,260	2,020	260	359
29	359	613	418	1,140	24,200	1,140	760	1,260	760	1,680	260	418
30	359	.....	418	1,140	15,700	1,140	685	1,140	760	1,140	359	478
31	306	.....	359	.....	8,260	.....	613	760	.....	930	.....	478
1909.												
1	478	306	152	152	2,220	7,480	1,030	3,360	685	1,260	1,530	613
2	478	306	152	260	1,840	9,420	1,030	2,650	613	1,030	1,260	613
3	478	306	152	260	1,680	14,900	1,260	1,840	359	1,030	1,260	2,650
4	478	306	152	306	1,530	29,700	1,140	1,390	359	930	1,260	10,600
5	478	260	152	306	1,260	10,600	930	1,140	306	930	1,140	11,800
6	418	260	152	260	1,260	6,320	1,030	1,030	260	685	1,030	8,640
7	359	219	183	260	1,390	3,870	840	1,030	359	613	1,140	6,320
8	359	219	152	306	1,530	3,360	760	1,140	359	613	1,030	2,650
9	359	219	260	306	1,140	2,430	613	1,140	306	613	1,030	2,430
10	359	183	260	260	1,030	2,020	930	930	306	685	930	1,390
11	359	219	219	260	840	2,020	840	1,030	306	1,030	930	1,260
12	306	219	219	260	840	1,680	685	1,260	260	930	930	1,260
13	306	219	260	260	685	1,260	685	1,260	260	613	613	1,390
14	306	306	219	306	613	1,030	543	1,390	306	543	1,260	930
15	306	418	219	260	1,260	1,140	613	1,140	306	543	418	760
16	306	359	183	219	685	840	418	840	260	478	543	760
17	306	306	183	219	1,030	840	418	1,030	5,600	478	478	613
18	306	306	183	183	1,140	3,360	543	1,390	2,220	478	478	930
19	306	260	183	152	1,840	2,880	685	1,680	1,840	930	418	760
20	359	260	183	152	1,680	6,700	478	2,650	2,020	7,080	418	760
21	306	219	152	183	1,390	3,120	306	1,840	1,680	2,880	478	613
22	306	219	152	183	1,260	1,840	306	1,390	2,020	10,200	418	613
23	306	219	152	219	1,260	1,530	418	930	2,430	11,000	418	1,030
24	260	219	152	152	1,530	1,140	28,500	840	1,680	8,640	543	930
25	260	219	219	123	1,390	1,030	23,900	840	1,680	6,700	478	930
26	260	183	260	123	14,900	2,220	8,640	840	1,680	4,660	478	1,030
27	359	152	219	183	18,000	3,620	5,940	760	1,680	4,400	418	1,030
28	306	152	219	219	11,400	4,400	4,960	613	1,390	3,870	418	760
29	306	.....	183	1,030	14,500	2,880	6,320	613	1,680	3,620	613	613
30	418	.....	152	3,120	3,870	1,840	4,660	760	1,530	2,020	685	543
31	359	.....	152	.....	3,620	.....	4,400	685	.....	1,530	.....	478
1910.												
1	478	418	306	18,000	418	543	96	219	219	61	359	152
2	478	543	306	10,600	418	478	96	219	183	61	306	152
3	478	478	306	7,860	359	418	260	183	152	61	306	152
4	418	478	260	5,600	359	359	152	183	123	183	306	183
5	418	418	219	2,880	306	359	123	183	96	760	260	183
6	418	478	219	2,020	306	306	2,650	183	219	613	219	152
7	306	478	183	2,430	306	359	930	61	84	478	183	123
8	306	478	183	2,020	306	359	760	40	84	359	183	123
9	306	478	183	2,220	306	359	613	40	27,400	359	152	123
10	260	418	219	18,000	306	306	543	40	11,000	359	152	123
11	260	418	219	9,820	306	260	478	40	3,870	359	152	123
12	219	418	260	7,860	306	260	478	40	2,020	418	152	123
13	219	418	219	7,080	760	260	418	40	1,260	478	152	123
14	359	418	260	5,940	760	260	359	40	760	418	123	123
15	306	418	260	1,840	613	260	359	40	760	418	123	183
16	260	418	219	1,390	543	260	359	40	478	359	123	183
17	260	418	260	1,140	613	260	306	40	543	359	152	219
18	306	418	306	930	543	260	260	40	478	306	183	183
19	260	418	306	840	7,090	219	260	40	418	306	183	183
20	260	418	306	760	9,040	183	260	40	418	359	260	183
21	260	359	306	760	15,700	183	543	40	418	359	219	183
22	219	359	306	685	11,800	84	418	40	359	359	219	260
23	260	418	306	685	4,660	84	359	40	359	306	183	613
24	183	418	306	685	2,650	84	359	61	359	306	183	613
25	183	306	306	613	1,390	61	306	61	306	359	183	613
26	219	306	306	543	1,140	61	418	183	306	2,650	183	478
27	219	306	306	478	840	61	359	478	183	1,390	183	418
28	219	359	260	478	760	61	359	418	84	760	152	359
29	183	.....	260	478	685	61	306	359	84	613	152	359
30	359	.....	260	418	685	61	306	306	61	478	152	306
31	359	.....	219	.....	613	.....	260	306	.....	478	.....	219

Monthly discharge of Colorado River at Austin, Tex., for 1907–1910.

[Drainage area, 37,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1907.						
January	306	123	217	0.0059	0.007	13,300
February	260	219	225	.0061	.006	12,500
March	260	152	203	.0055	.006	12,500
April	543	84	145	.0039	.004	8,630
May	28,100	123	3,400	.092	.11	209,000
June	18,400	183	3,100	.084	.09	184,000
July	27,800	359	4,680	.126	.15	288,000
August	840	72	266	.0072	.008	16,400
September	613	50	156	.0042	.005	9,280
October	20,700	478	3,480	.094	.11	214,000
November	27,000	613	3,920	.106	.12	233,000
December	1,840	359	949	.026	.03	58,400
The year	28,100	50	1,740	.047	.65	1,260,000
1908.						
January	1,260	260	515	.014	.02	31,700
February	3,120	306	885	.024	.03	50,900
March	1,680	359	589	.016	.02	36,200
April	72,600	183	9,970	.269	.30	593,000
May	54,700	543	11,100	.300	.35	682,000
June	7,090	613	2,070	.056	.06	123,000
July	8,260	613	2,030	.055	.06	125,000
August	8,640	359	1,580	.043	.05	97,200
September	6,320	418	1,610	.044	.05	95,800
October	7,080	359	1,190	.032	.04	73,200
November	760	260	367	.0099	.01	21,800
December	2,020	359	566	.015	.02	34,800
The year	72,600	183	2,710	.073	1.01	1,960,000
1909.						
January	478	260	350	.0095	.01	21,500
February	418	152	251	.0068	.007	13,900
March	260	152	188	.0051	.006	11,600
April	3,120	123	349	.0094	.01	20,800
May	18,000	613	3,180	.086	.10	196,000
June	29,700	840	4,520	.122	.14	269,000
July	28,500	306	3,350	.091	.10	206,000
August	3,360	613	1,270	.034	.04	78,100
September	5,600	260	1,160	.031	.03	69,000
October	11,000	478	2,610	.071	.08	160,000
November	1,530	418	768	.021	.02	45,700
December	11,800	478	2,120	.057	.07	130,000
The year	29,700	123	1,690	.046	.61	1,050,000
1910.						
January	478	183	298	.0081	.009	18,300
February	543	306	417	.011	.01	23,200
March	306	183	263	.0071	.008	16,200
April	18,000	478	3,840	.104	.12	228,000
May	15,700	306	2,090	.056	.06	129,000
June	543	61	238	.0064	.007	14,200
July	2,650	96	444	.012	.01	27,300
August	478	40	130	.0035	.004	7,990
September	27,400	61	1,770	.048	.05	105,000
October	2,650	61	488	.013	.01	30,000
November	359	123	195	.0053	.006	11,600
December	613	123	242	.0065	.007	14,900
The year	27,400	40	865	.023	.30	626,000

NOTE.—The measurements made in 1910 are the only ones since 1906. The estimates for 1907–1910, therefore, may be somewhat in error.

COLORADO RIVER AT COLUMBUS, TEX.

This station was established in December, 1902. It is located at the highway bridge east of Columbus.

A gage is marked on the downstream side of the pier on the west side of the three-span highway bridge. Gage datum is taken at 50 feet below the top of this pier, and the observer measures down from this point with a tagged chain and lead weight.

Discharge measurements are made from bridge at which the gage is located.

The following discharge measurement was made by T. U. Taylor:

August 23, 1910: Gage height, 4.7 feet; discharge, 124 second-feet.

Daily gage height, in feet, of Colorado River at Columbus, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.4	6.9	7.4	6.7	6.5	34.2	9.6	8.0	5.8	5.3	11.2	10.3
2	6.4	6.9	7.3	6.7	7.0	25.0	8.1	7.8	5.6	5.3	13.0	10.0
3	7.0	6.9	7.3	6.6	6.9	20.0	7.9	7.6	5.4	5.4	13.0	10.3
4	7.0	6.9	7.2	6.6	6.6	14.0	7.8	7.6	5.4	5.5	9.8	9.8
5	7.0	6.9	7.2	6.5	6.5	13.0	7.7	7.5	5.4	5.5	8.8	9.8
6	7.0	6.9	7.2	6.5	6.5	11.8	13.5	7.5	5.2	6.0	8.8	9.7
7	7.0	6.8	7.2	6.4	6.5	10.8	12.0	7.2	5.2	6.0	9.8	9.7
8	6.9	6.8	7.1	6.4	6.5	10.2	10.5	7.2	5.2	6.1	10.8	9.5
9	6.8	6.6	7.1	6.4	8.0	9.6	10.0	7.2	5.9	17.5	11.3	9.0
10	7.0	6.6	7.1	6.3	12.0	9.1	10.0	7.2	5.9	17.5	13.2	9.0
11	7.0	6.6	6.7	6.2	10.0	8.7	9.0	7.2	5.8	19.0	11.4	8.0
12	7.0	6.6	6.7	6.0	11.8	8.3	8.0	8.0	5.8	18.5	10.8	8.7
13	6.9	6.6	6.7	6.0	9.0	8.2	7.8	7.7	5.8	14.0	9.6	18.0
14	6.9	6.5	6.7	6.0	10.2	8.2	7.6	7.6	5.8	13.2	9.2	11.5
15	6.9	6.4	6.6	6.0	9.8	8.0	9.0	7.5	5.6	11.2	9.8	9.8
16	6.8	6.4	6.5	6.0	9.0	7.9	23.2	7.4	5.6	11.1	10.0	9.0
17	6.8	6.4	6.5	6.1	8.9	7.8	20.2	6.8	5.5	10.1	21.0	8.3
18	6.7	6.4	6.7	6.1	8.7	7.5	18.1	6.8	5.5	9.8	30.0	8.0
19	6.7	6.5	6.5	6.0	8.6	7.1	15.0	6.7	5.5	9.8	25.0	7.7
20	6.7	6.5	6.4	6.0	8.0	7.1	13.1	6.6	5.6	9.6	32.5	7.3
21	6.7	6.5	6.3	6.1	7.9	7.1	12.0	6.4	5.6	9.5	34.0	7.2
22	6.8	6.5	6.3	7.4	7.8	7.7	11.6	6.3	5.5	8.7	22.0	9.8
23	6.8	6.5	6.2	7.0	10.0	7.6	11.4	6.3	5.4	8.7	16.0	8.5
24	6.9	6.5	6.2	6.4	9.0	7.1	9.8	6.2	5.4	8.6	14.5	9.7
25	6.9	10.7	6.2	6.6	8.0	17.8	9.0	6.2	5.4	9.0	12.5	8.3
26	6.8	9.0	6.3	6.6	8.0	15.0	8.4	6.2	5.5	8.5	11.0	7.9
27	6.8	7.4	6.4	6.6	10.0	12.0	8.0	6.2	5.6	8.1	10.0	7.7
28	6.8	7.4	6.4	6.5	10.0	11.0	8.0	6.1	5.4	8.1	14.5	7.5
29	6.9	.....	6.6	6.5	29.5	10.2	7.8	6.0	5.4	8.0	12.5	7.3
30	6.9	.....	6.6	6.5	33.5	9.6	7.6	6.0	5.1	20.0	11.2	7.0
31	6.8	.....	6.6	.....	35.0	.....	8.2	6.0	.....	14.0	.....	7.0
1908.												
1	7.0	5.9	6.9	6.3	13.3	23.8	8.2	7.0	8.6	7.4	8.8	7.2
2	6.8	5.8	6.9	6.3	12.3	16.0	8.9	7.0	8.1	7.2	8.3	7.4
3	6.7	5.8	6.8	6.1	11.5	15.8	8.3	7.0	7.6	7.0	7.8	6.2
4	6.7	5.8	6.8	6.0	11.1	14.2	9.2	7.0	7.3	6.9	7.5	6.6
5	6.7	5.8	6.7	6.0	10.7	13.2	7.9	7.3	7.1	6.8	7.3	6.4
6	6.9	5.8	6.6	6.0	10.2	12.5	7.8	7.1	6.8	6.7	7.0	6.3
7	9.7	5.8	6.5	5.9	9.6	11.9	7.7	7.1	6.7	6.7	6.9	6.3
8	8.4	5.8	6.5	5.9	9.5	11.3	9.9	7.6	6.6	6.6	6.8	6.6
9	7.5	19.0	6.4	5.9	9.3	10.9	10.8	7.6	6.7	6.5	7.7	7.8
10	7.1	20.8	6.3	5.7	9.0	10.5	10.7	7.3	6.7	6.8	6.6	7.7
11	6.7	13.4	6.3	6.0	8.7	10.2	9.9	11.5	6.6	6.8	6.5	7.6
12	6.7	12.0	6.3	6.7	8.6	9.8	9.2	12.3	6.6	7.1	6.4	7.7
13	6.6	11.7	6.3	6.9	8.4	9.6	13.8	10.9	7.2	6.8	6.4	7.4
14	6.5	10.9	6.3	6.7	8.2	9.4	12.6	9.9	7.7	7.4	6.5	7.1
15	6.4	10.2	8.1	6.7	21.2	9.2	11.3	9.2	7.8	7.2	6.5	6.9
16	6.3	9.2	8.3	6.3	11.8	8.9	10.4	8.6	7.7	6.9	6.4	6.7
17	6.3	8.8	7.8	6.2	10.2	8.8	9.7	8.3	7.7	6.7	6.4	6.5
18	6.2	8.5	7.6	9.8	13.2	8.1	9.1	8.0	7.8	6.6	6.3	6.6
19	6.2	8.2	7.4	10.0	11.4	8.5	8.6	7.7	7.6	6.6	6.3	6.4
20	6.2	8.5	7.1	12.9	10.2	8.4	8.3	7.7	7.3	6.6	6.3	6.5

Daily gage height, in feet, of Colorado River at Columbus, Tex., for 1907–1910—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	6.1	7.8	7.0	18.8	14.5	9.2	8.0	7.6	7.3	6.5	6.2	6.5
22	6.1	7.6	7.0	23.8	25.3	9.6	7.8	7.4	9.7	6.4	6.2	6.4
23	6.0	7.4	7.0	28.6	25.5	9.4	7.7	7.2	9.9	6.5	6.2	6.4
24	6.0	7.2	7.0	21.1	16.9	8.4	7.6	7.1	9.6	7.1	6.2	6.4
25	6.0	7.3	6.8	33.0	23.9	9.3	7.5	6.9	9.1	6.1	6.2	6.3
26	6.0	7.8	6.7	35.1	30.0	9.1	7.4	6.8	9.1	6.6	6.1	6.3
27	6.0	8.2	6.6	35.8	32.5	8.7	7.3	6.7	8.5	6.7	6.1	6.3
28	6.0	7.7	6.6	30.0	33.6	7.9	7.4	6.7	8.3	6.5	6.0	6.3
29	5.9	7.3	6.5	17.6	33.7	7.8	7.2	7.6	7.9	11.5	6.2	6.2
30	5.9	.....	6.5	14.6	33.8	7.7	7.1	8.0	7.8	10.6	6.4	6.2
31	5.9	.....	6.4	.....	32.2	.....	7.1	8.9	.....	9.6	.....	6.2
1909.												
1	9.8	5.9	5.7	5.5	7.0	11.8	10.3	11.4	6.1	7.6	16.2	7.6
2	7.7	5.9	5.7	5.5	6.4	10.7	9.2	10.2	6.0	7.5	10.8	7.4
3	7.0	5.9	5.7	5.4	6.1	10.0	8.3	8.7	5.9	7.2	9.2	7.2
4	6.7	5.9	5.7	5.4	6.7	13.4	8.0	8.2	5.9	6.9	8.6	7.1
5	6.6	5.9	5.6	5.4	6.7	20.9	7.6	7.8	5.9	6.7	8.3	7.6
6	6.3	5.9	5.6	5.4	7.1	18.0	7.3	7.5	5.9	6.6	8.0	12.0
7	6.3	5.9	5.6	5.4	6.8	13.8	7.0	7.3	5.8	6.4	7.8	15.2
8	6.3	5.9	5.6	5.6	8.7	12.2	6.9	7.3	5.7	6.3	7.6	15.6
9	6.3	5.8	5.6	10.0	8.8	10.7	6.8	7.2	6.0	6.1	7.5	11.2
10	6.2	5.8	5.6	6.9	7.3	10.0	7.2	7.2	6.2	6.1	7.5	10.8
11	6.1	5.8	5.6	6.8	6.6	9.3	7.0	7.1	6.1	6.1	7.6	10.6
12	6.0	5.8	5.5	6.7	6.2	8.7	7.2	6.9	6.0	6.0	7.7	9.8
13	6.2	5.8	5.5	5.8	6.4	8.0	7.0	6.7	5.9	5.8	8.0	9.5
14	6.1	5.8	5.5	5.8	6.2	7.8	6.8	6.5	5.8	5.8	7.8	9.1
15	6.1	5.9	5.6	5.7	6.0	7.6	6.8	6.4	5.7	5.7	7.6	9.0
16	6.0	5.9	5.6	5.6	9.0	7.3	6.7	6.2	5.7	5.7	7.5	8.6
17	6.0	5.9	5.6	5.5	8.6	8.0	6.6	6.2	5.6	5.8	7.4	8.2
18	6.0	5.9	5.6	5.5	7.3	7.1	6.5	7.5	5.6	5.6	7.4	8.1
19	6.0	5.8	5.6	5.5	7.2	6.7	6.3	7.2	5.6	5.7	7.3	8.1
20	6.1	5.8	5.6	5.4	7.8	7.1	6.2	6.9	10.0	5.8	7.0	7.9
21	6.0	5.8	5.6	5.4	7.5	7.9	6.1	7.3	9.2	7.6	7.0	7.8
22	6.0	5.8	5.6	5.4	8.2	9.0	10.7	9.9	8.2	9.6	6.9	7.7
23	6.0	5.8	5.6	5.4	7.7	11.4	9.4	8.9	7.7	12.1	6.8	7.6
24	6.0	5.8	5.6	5.4	7.2	10.4	8.7	8.2	7.2	14.6	6.8	7.6
25	6.0	5.8	5.6	5.4	7.0	9.3	8.3	7.7	6.9	13.8	7.0	7.5
26	6.1	5.7	5.6	5.4	6.8	8.8	16.9	7.3	6.9	12.5	7.7	7.7
27	6.0	5.7	5.5	5.4	6.7	8.2	14.2	6.9	6.8	11.2	7.6	7.8
28	5.9	5.7	5.5	5.4	10.8	7.8	14.3	6.7	6.6	10.1	7.5	7.6
29	5.9	.....	5.5	5.4	15.3	10.7	12.4	6.6	6.5	9.4	7.4	7.5
30	5.9	.....	5.5	5.8	13.6	9.9	12.2	6.5	7.9	8.8	7.4	7.5
31	5.9	.....	5.5	.....	14.6	.....	11.4	6.3	.....	10.1	.....	7.3
1910.												
1	6.8	5.9	5.7	5.0	6.9	7.9	5.4	5.3	5.0	5.8	7.1	5.1
2	6.7	5.9	5.6	5.2	9.9	7.7	5.3	5.2	5.0	5.8	6.9	5.0
3	6.7	6.0	5.6	14.0	6.7	7.5	5.5	5.2	5.2	5.7	6.6	5.0
4	6.6	6.0	5.5	15.1	6.6	7.3	5.9	5.1	4.7	5.6	6.4	5.0
5	6.6	5.9	5.5	14.5	6.5	8.1	6.0	5.1	4.6	5.5	6.2	5.0
6	6.5	6.0	5.5	12.9	6.5	7.9	5.5	5.1	4.4	6.2	6.1	4.9
7	6.7	6.1	5.4	11.5	6.5	7.1	5.5	5.0	4.3	6.8	6.0	4.9
8	6.6	6.1	5.4	10.4	6.4	6.9	5.4	5.0	4.3	6.4	5.9	4.9
9	6.5	6.0	5.3	10.2	6.0	6.6	5.4	5.0	4.2	6.4	5.8	4.8
10	6.5	6.0	5.3	10.7	6.2	6.5	6.7	5.0	4.2	6.5	5.8	4.8
11	6.5	6.0	5.3	12.5	6.1	6.3	7.1	4.9	18.2	6.7	5.7	4.8
12	6.4	5.9	5.3	15.6	6.0	6.2	6.7	4.9	13.2	6.4	5.6	4.8
13	6.4	5.9	5.2	16.0	5.9	6.1	6.6	4.9	13.0	9.4	5.5	5.0
14	6.5	5.9	5.2	13.7	5.8	6.0	6.5	4.8	11.2	7.8	5.5	5.0
15	6.5	5.9	5.2	13.5	5.8	5.9	6.4	4.8	10.3	7.7	5.4	5.0
16	6.4	5.8	5.2	11.7	5.7	5.8	6.2	4.9	9.2	7.0	5.4	4.9
17	6.4	5.8	5.1	10.7	6.1	5.7	6.1	4.8	8.5	6.3	5.3	5.0
18	6.3	5.8	5.1	10.0	6.8	5.7	6.1	4.8	8.0	6.1	5.3	5.0
19	6.3	5.8	5.1	9.3	7.2	5.6	5.9	4.7	7.6	6.1	5.3	5.0
20	6.3	5.8	5.1	8.6	8.0	5.6	5.7	4.7	7.3	6.0	5.5	5.0
21	6.3	5.7	5.0	8.4	14.3	5.7	5.6	4.6	7.1	6.0	5.4	4.9
22	6.2	5.7	5.0	8.0	12.1	5.6	5.5	4.6	7.0	5.9	5.3	4.9
23	6.2	5.7	5.0	7.9	20.9	5.5	5.5	4.6	6.7	5.9	5.3	10.8
24	6.1	5.7	5.0	7.7	18.7	5.5	5.9	4.5	6.5	5.8	5.3	14.5
25	6.1	5.7	5.0	7.5	13.5	5.5	6.0	4.5	6.3	5.8	5.2	11.1
26	6.1	5.7	5.0	7.4	12.0	5.7	5.8	4.5	6.1	5.7	5.2	9.5
27	6.0	5.7	5.0	7.3	10.4	5.6	5.7	4.5	6.0	5.7	5.2	9.4
28	6.0	5.8	4.9	7.1	9.8	5.6	5.6	4.5	6.0	5.6	5.2	8.2
29	6.0	.....	4.9	7.0	9.0	5.5	5.5	4.4	5.9	5.5	5.1	7.5
30	5.9	.....	4.9	7.0	8.5	5.4	5.5	4.4	5.9	7.4	5.1	7.0
31	5.9	.....	4.9	.....	8.2	.....	5.4	4.4	.....	7.5	.....	7.4

Daily discharge, in second-feet, of Colorado River at Columbus, Tex., for 1907–1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	950	1,220	1,520	1,120	1,000	29,900	2,990	1,880	650	400	4,210	3,490
2	950	1,220	1,460	1,120	1,280	22,200	1,940	1,760	550	400	5,710	3,270
3	1,280	1,220	1,460	1,060	1,220	14,000	1,820	1,640	450	450	5,710	3,490
4	1,280	1,220	1,400	1,060	1,060	6,610	1,760	1,640	450	500	3,130	3,130
5	1,280	1,220	1,400	1,000	1,000	5,710	1,700	1,580	450	500	2,430	3,130
6	1,280	1,220	1,400	1,000	1,000	4,690	6,160	1,580	350	750	2,430	3,060
7	1,280	1,170	1,400	950	1,000	3,890	4,850	1,400	350	750	3,130	3,060
8	1,220	1,170	1,340	950	1,000	3,410	3,650	1,400	350	800	3,890	2,920
9	1,170	1,060	1,340	950	1,880	2,990	3,270	1,400	700	10,500	4,290	2,570
10	1,280	1,060	1,340	900	4,850	2,640	3,270	1,400	700	10 500	5,890	2,570
11	1,280	1,060	1,120	850	3,270	2,360	2,570	1,400	650	12,500	4,370	1,880
12	1,280	1,060	1,120	750	4,690	2,080	1,880	1,880	650	11,800	3,890	2,360
13	1,220	1,060	1 120	750	2,570	2,010	1,760	1,700	650	6,610	2,990	11,100
14	1,220	1,000	1,120	750	3,410	2,010	1,640	1,640	650	5,890	2,710	4,450
15	1,220	950	1,060	750	3,130	1,880	2,570	1,580	550	4,210	3,130	3,130
16	1,170	950	1,000	750	2,570	1,820	19,000	1,520	550	4,130	3,270	2,570
17	1,170	950	1,000	800	2,500	1,760	14,300	1,170	500	3,340	15,500	2,080
18	1,120	950	1,120	800	2,360	1,580	11,300	1,170	500	3,130	31,800	1,880
19	1,120	1,000	1,000	750	2,290	1,340	7,590	1,120	500	3,130	22,200	1,700
20	1,120	1,000	950	750	1,880	1,340	5,800	1,060	550	2,990	36,600	1,460
21	1,120	1,000	900	800	1,820	1,340	4,850	950	550	2,920	39,600	1,400
22	1,170	1,000	900	1,520	1,760	1,700	4,530	900	500	2,360	17,000	3,130
23	1,170	1,000	850	1,280	3,270	1,640	4,370	900	450	2,360	8,660	2,220
24	1,220	1,000	850	950	2,570	1,340	3,130	850	450	2,290	7,090	3,060
25	1,220	3,810	850	1,060	1,880	10,900	2,570	850	450	2,570	5,260	2,080
26	1,170	2,570	900	1,060	1,880	7,590	2,150	850	500	2,220	4,050	1,820
27	1,170	1,520	950	1,060	3,270	4,850	1,880	850	550	1,940	3,270	1,700
28	1,170	1,520	950	1,000	3,270	4,050	1,880	800	450	1,940	7,090	1,580
29	1,220	.....	1,060	1,000	30,800	3,410	1,760	750	450	1,880	5,260	1,460
30	1,220	.....	1,060	1,000	38,600	2,990	1,640	750	305	14,000	4,210	1,280
31	1,170	.....	1,060	.....	41,500	.....	2,010	750	.....	6,610	.....	1,280
1908.												
1	1,280	700	1,220	900	5,980	20,100	2,010	1,280	2,290	1,520	2,430	1,400
2	1,170	650	1,220	900	5,090	8,660	2,500	1,280	1,940	1,400	2,080	1,520
3	1,120	650	1,170	800	4,450	8,440	2,080	1,280	1,640	1,280	1,760	850
4	1,120	650	1,170	750	4,130	6,790	2,710	1,280	1,460	1,220	1,580	1,060
5	1,120	650	1,120	750	3,810	5,890	1,820	1,460	1,340	1,170	1,460	950
6	1,220	650	1,060	750	3,410	5,260	1,760	1,340	1,170	1,120	1,280	900
7	3,060	650	1,000	700	2,990	4,770	1,700	1,340	1,120	1,120	1,220	900
8	2,150	650	1,000	700	2,920	4,290	3,200	1,640	1,060	1,060	1,170	1,060
9	1,580	12,500	950	700	2,780	3,970	3,890	1,640	1,120	1,060	1,700	1,760
10	1,340	15,200	900	600	2,570	3,650	3,810	1,460	1,120	1,170	1,060	1,700
11	1,120	6,070	900	750	2,360	3,410	3,200	4,450	1,060	1,170	1,000	1,640
12	1,120	4,850	900	1,120	2,290	3,130	2,710	5,090	1,060	1,340	950	1,700
13	1,060	4,610	900	1,220	2,150	2,990	6,430	3,970	1,400	1,170	950	1,520
14	1,000	3,970	900	1,120	2,010	2,850	5,350	3,200	1,700	1,520	1,000	1,340
15	950	3,410	1,940	1,120	15,800	2,710	4,290	2,710	1,760	1,400	1,000	1,220
16	900	2,710	2,080	900	4,690	2,500	3,570	2,290	1,700	1,220	950	1,120
17	900	2,430	1,760	850	3,410	2,430	3,060	2,080	1,700	1,120	950	1,000
18	850	2,220	1,640	3,130	5,890	1,940	2,640	1,880	1,760	1,060	900	1,060
19	850	2,010	1,520	3,270	4,370	2,220	2,290	1,700	1,640	1,060	900	950
20	850	2,220	1,340	5,620	3,410	2,150	2,080	1,700	1,460	1,060	900	1,000
21	800	1,760	1,280	12,200	7,090	2,710	1,880	1,640	1,460	1,000	850	1,000
22	800	1,640	1,280	20,100	22,800	2,990	1,760	1,520	3,060	950	850	1,000
23	750	1,520	1,280	29,100	23,100	2,850	1,700	1,400	3,200	1,000	850	950
24	750	1,400	1,280	15,600	9,740	2,150	1,640	1,340	2,990	1,340	850	950
25	750	1,460	1,170	37,600	20,200	2,780	1,580	1,220	2,640	800	850	900
26	750	1,760	1,120	41,700	31,800	2,640	1,520	1,170	2,640	1,060	800	900
27	750	2,010	1,060	43,100	36,600	2,360	1,460	1,120	2,220	1,120	800	900
28	750	1,700	1,060	31,800	38,800	1,820	1,520	1,120	2,080	1,000	750	900
29	700	1,460	1,000	10,600	39,000	1,760	1,400	1,640	1,820	4,450	850	850
30	700	.....	1,000	7,190	39,200	1,700	1,340	1,880	1,760	3,730	950	850
31	700	.....	950	.....	36,100	.....	1,340	2,500	.....	2,990	.....	850

Daily discharge, in second-feet, of Colorado River at Columbus, Tex., for 1907–1910. Con

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1909.												
1	3,130	700	600	500	1,280	4,690	3,490	4,370	800	1,640	8,900	1,640
2	1,700	700	600	500	950	3,810	2,710	3,410	750	1,580	3,890	1,520
3	1,280	700	600	450	800	3,270	2,080	2,360	700	1,400	2,710	1,400
4	1,120	700	600	450	1,120	6,070	1,880	2,010	700	1,220	2,290	1,340
5	1,060	700	550	450	1,120	15,300	1,640	1,760	700	1,120	2,080	1,640
6	900	700	550	450	1,340	11,100	1,460	1,580	700	1,060	1,880	4,850
7	900	700	550	450	1,170	6,430	1,280	1,460	650	950	1,760	7,790
8	900	700	550	550	2,360	5,010	1,220	1,460	600	900	1,640	8,220
9	900	650	550	3,270	2,430	3,810	1,170	1,400	750	800	1,580	4,210
10	850	650	550	1,220	1,460	3,270	1,400	1,400	850	800	1,580	3,890
11	800	650	550	1,170	1,060	2,780	1,280	1,340	800	800	1,640	3,730
12	750	650	500	1,120	850	2,360	1,400	1,220	750	750	1,700	3,130
13	850	650	500	650	950	1,880	1,280	1,120	700	650	1,880	2,920
14	800	650	500	650	850	1,760	1,170	1,000	650	650	1,760	2,640
15	800	700	550	660	750	1,640	1,170	950	600	600	1,640	2,570
16	750	700	550	550	2,570	1,460	1,120	850	600	600	1,580	2,290
17	750	700	550	500	2,290	1,880	1,060	850	550	650	1,520	2,010
18	750	700	550	500	1,460	1,340	1,000	1,580	550	550	1,520	1,940
19	750	650	550	500	1,400	1,120	900	1,400	550	600	1,460	1,940
20	800	650	550	450	1,760	1,340	850	1,220	3,270	650	1,280	1,820
21	750	650	550	450	1,580	1,820	800	1,460	2,710	1,640	1,280	1,760
22	750	650	550	450	2,010	2,570	3,810	3,200	2,010	2,990	1,220	1,700
23	750	650	550	450	1,700	4,370	2,850	2,500	1,700	4,930	1,170	1,640
24	750	650	550	450	1,400	3,570	2,360	2,010	1,400	7,190	1,170	1,640
25	750	650	550	450	1,280	2,780	2,080	1,700	1,220	6,430	1,280	1,580
26	800	600	550	450	1,170	2,430	9,740	1,460	1,220	5,260	1,700	1,700
27	750	600	500	450	1,120	2,010	6,790	1,220	1,170	4,210	1,640	1,760
28	700	600	500	450	3,890	1,760	6,890	1,120	1,060	3,340	1,580	1,640
29	700	.....	500	450	7,890	3,810	5,170	1,060	1,000	2,850	1,520	1,580
30	700	.....	500	650	6,250	3,200	5,010	1,000	1,820	2,430	1,520	1,580
31	700	.....	500	.....	7,190	.....	4,370	900	.....	3,340	.....	1,460
1910.												
1	1,170	700	600	260	1,220	1,820	450	400	260	650	1,340	305
2	1,120	700	550	350	3,200	1,700	400	350	260	650	1,220	260
3	1,120	750	550	6,610	1,120	1,580	500	350	350	600	1,060	260
4	1,060	750	500	7,690	1,060	1,460	700	305	135	550	950	260
5	1,060	700	500	7,090	1,000	1,940	750	305	100	500	850	260
6	1,000	750	500	5,620	1,000	1,820	500	305	45	850	800	215
7	1,120	800	450	4,450	1,000	1,340	500	260	25	1,170	750	215
8	1,060	800	450	3,570	950	1,220	450	260	25	950	700	215
9	1,000	750	400	3,410	750	1,060	450	260	10	950	650	175
10	1,000	750	400	3,810	850	1,000	1,120	260	10	1,000	650	175
11	1,000	750	400	5,260	800	900	1,340	215	11,400	1,120	600	175
12	950	700	400	8,220	750	850	1,120	215	5,890	950	550	175
13	950	700	350	8,660	700	800	1,060	215	5,710	2,850	500	260
14	1,000	700	350	6,340	650	750	1,000	175	4,210	1,760	500	260
15	1,000	700	350	6,160	650	700	950	175	3,490	1,700	450	260
16	950	650	350	4,610	600	650	850	215	2,710	1,280	450	215
17	950	650	305	3,810	800	600	800	175	2,220	900	400	260
18	900	650	305	3,270	1,170	600	800	175	1,880	800	400	260
19	900	650	305	2,780	1,400	550	700	135	1,640	800	400	260
20	900	650	305	2,290	1,880	550	600	135	1,460	750	500	260
21	900	600	260	2,150	6,890	600	550	100	1,340	750	450	215
22	850	600	260	1,880	4,930	550	500	100	1,280	700	400	215
23	850	600	260	1,820	15,300	500	500	100	1,120	700	400	3,890
24	800	600	260	1,700	12,100	500	700	70	1,000	650	400	7,090
25	800	600	260	1,580	6,160	500	750	70	900	650	350	4,130
26	800	600	260	1,520	4,850	600	650	70	800	600	350	2,920
27	750	600	260	1,460	3,570	550	600	70	750	600	350	2,850
28	750	650	215	1,340	3,130	550	550	70	750	550	350	2,010
29	750	.....	215	1,280	2,570	500	500	45	700	500	305	1,580
30	700	.....	215	1,280	2,220	450	500	45	700	1,520	305	1,280
31	700	.....	215	.....	2,010	.....	450	45	.....	1,580	.....	1,520

Monthly discharge of Colorado River at Columbus, Tex., for 1907–1910.

[Drainage area, 40,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1907.						
January	1,280	950	1,190	0.030	0.03	73,200
February	3,810	950	1,260	.032	.03	70,000
March	1,520	850	1,130	.028	.03	69,500
April	1,520	750	951	.024	.03	56,600
May	41,500	1,000	5,630	.141	.16	346,000
June	29,900	1,340	5,130	.128	.14	305,000
July	19,000	1,640	4,210	.105	.12	259,000
August	1,880	750	1,260	.032	.04	77,500
September	700	305	514	.013	.01	30,600
October	14,000	400	4,010	.100	.12	247,000
November	39,600	2,430	8,960	.224	.25	533,000
December	11,100	1,280	2,720	.068	.08	167,000
The year	41,500	305	3,090	.077	1.04	2,230,000
1908.						
January	3,060	700	1,060	.026	.03	65,200
February	15,200	650	2,830	.071	.08	163,000
March	2,080	900	1,200	.030	.03	73,800
April	43,100	600	9,190	.230	.26	547,000
May	39,200	2,010	12,500	.312	.36	769,000
June	20,100	1,700	4,060	.102	.11	242,000
July	6,430	1,340	2,520	.063	.07	155,000
August	5,090	1,120	1,920	.048	.06	118,000
September	3,200	1,060	1,770	.044	.05	105,000
October	4,450	800	1,410	.035	.04	86,700
November	2,430	750	1,120	.028	.03	66,600
December	1,760	850	1,120	.028	.03	68,900
The year	43,100	600	3,400	.085	1.15	2,460,000
1909.						
January	3,130	700	924	.023	.03	56,800
February	700	600	666	.017	.02	37,000
March	600	500	544	.014	.02	33,400
April	3,270	450	656	.016	.02	39,000
May	7,890	750	2,050	.051	.06	126,000
June	15,300	1,120	3,620	.090	.10	215,000
July	9,740	800	2,560	.064	.07	157,000
August	4,370	850	1,620	.040	.05	99,600
September	3,270	550	1,050	.026	.03	62,500
October	7,190	550	2,020	.050	.06	124,000
November	8,900	1,170	1,950	.049	.05	116,000
December	8,220	1,340	2,570	.064	.07	158,000
The year	15,300	450	1,690	.042	.58	1,220,000
1910.						
January	1,170	700	931	.023	.03	57,200
February	800	600	682	.017	.02	37,900
March	600	215	355	.0089	.01	21,800
April	8,660	260	3,680	.092	.10	219,000
May	15,300	600	2,750	.069	.08	169,000
June	1,940	450	906	.023	.03	53,900
July	1,340	400	687	.017	.02	42,200
August	400	45	183	.0046	.005	11,300
September	11,400	10	1,710	.043	.05	102,000
October	2,850	500	954	.024	.03	58,700
November	1,340	305	579	.014	.02	34,500
December	7,090	175	1,050	.026	.03	64,600
The year	15,300	10	1,200	.030	.42	872,000

NOTE.—The measurement made in 1910 is the only one since 1905. The estimates for 1907–1910, therefore, may be somewhat in error.

RIO GRANDE DRAINAGE BASIN.

GENERAL FEATURES.

The Rio Grande basin is a long, narrow strip of country extending from the southern part of Colorado southeastward to the Gulf of Mexico. The perennial supply of water for the upper third of this basin comes principally from a comparatively small area of about 2,000 square miles of lofty mountains in Colorado and the extreme northern part of New Mexico. The Conchos enters the river from the Mexican side some 200 miles below El Paso and brings a good perennial flow as well as enormous floods in the summer and fall. Pecos and Devils rivers and springs also substantially augment the perennial supply, and many other tributaries furnish flood discharges, so that the "lower river" is not dependent on the mountain area for its perennial flow. The flood season above the Conchos is May and June; below it is August and September. Frequently the river is dry at El Paso when the lower river country is inundated. In addition to the areas contributing a perennial supply of water and a spasmodic supply, a vast area of "lost river" basins which supply no water at any time, may, from topographic considerations, be included within this great catchment basin.

The Rio Grande rises in the mountainous area to the south and east of the Continental Divide in southwestern Colorado, flows eastward for a time as a mountain stream, enters the San Luis Valley about 80 miles below its source and then turns southward. In this valley it receives from the west Alamos, La Jara, and Conejos rivers; from the east the Trinchera, Culebra, and Rio Costilla; and possibly from the north the waters of Saguache and San Luis rivers, by seepage. About 4 miles north of the Colorado State line it enters a long canyon locally known as the Rio Grande canyon. From the east there enter this canyon two tributaries, Red River and Rio Hondo.

This canyon is 300 or 400 feet deep in places, appearing from above as a gash in an otherwise level mesa. Its south end is 3 miles above Embudo, N. Mex., where the walls open and the river enters Espanola Valley. The general slope of the valley is toward the south, the river descending, however, more rapidly than the surface of the country. In the valley above Embudo the river receives from the east Taos River, Embudo Creek, and other small streams, and in Espanola Valley it is increased by the Chama, flowing in from the west, and by a number of streams from the east.

At the lower end of Espanola Valley the river passes through White Rock Canyon, a gorge in a range of hills stretching from the Jemez to the Santa Fe Mountains. From Pena Blanca, near the lower end of this canyon, nearly to Socorro, the river flows in a valley 1 to 3

miles wide, bounded on each side by mesas that rise 300 to 600 feet above the river. About 20 miles below Pena Blanca the Jemez enters from the west, and 60 miles or more below Albuquerque the Puerco comes in from the same side. The Puerco is a torrential stream with no perennial flow. Below these streams the Rio Grande has no tributaries of note until it receives the Pecos, about 400 miles by river below El Paso.

At and below Socorro the valley contracts until it becomes too narrow for agriculture, but from San Antonio to San Marcial its width ranges from 1 to 2 miles. Below San Marcial the river swings to the west around the Cristobal and Caballos mountains, which lie along the west edge of the Jornada del Muerto, the valley from San Marcial to Rincon being narrow, low, and marshy. At Rincon the river enters a canyon which extends to Fort Selden, a distance of 15 miles. The Mesilla Valley, the most fertile valley in New Mexico, begins below Fort Selden and extends to the pass above El Paso, a distance of over 50 miles. Above El Paso the banks of the river again assume the canyon-like character for 3 miles, and the river emerging from this enters the Ysleta Valley, now commonly called the El Paso Valley.

The canyons above these valleys are not cut into hard, indurated rocks, but are bordered in many places by steep walls of comparatively soft, friable sandstones, alternating with conglomerates or beds of clay, the whole series in the northern part of New Mexico, at least, being capped by a vesicular lava. The fall through these canyons being great, the down-cutting is rapid, and thus the waters are supplied constantly with fresh detritus, part of which is deposited in turn in the valley below.

From El Paso to the Gulf the river forms the boundary between Mexico and the United States.

From source to mouth the Rio Grande is nearly 2,000 miles long, and its drainage area comprises about 248,000 square miles.

Many national forests have been established on the headwaters of the Rio Grande and its tributaries, both in Colorado and New Mexico. The drainage basin of the Rio Grande, exclusive of the Pecos, includes between 5,000 and 6,000 square miles of merchantable timber land, 6,000 square miles of woodland and sparsely timbered land, and 2,000 square miles of burned and cut-over land, the remainder being sagebrush and open land.

The largest tributaries are the Conchos, which enters from the Mexico side, 200 miles below El Paso; the Conejos, which joins the Rio Grande just above the Colorado-New Mexico line; the Chama, which enters it in Espanola Valley; the Pecos, which joins it in the southwestern part of Texas; and Devils River, about 50 miles below

the Pecos. Most of the remaining tributaries are intermittent in character.

The mountains at the headwaters reach altitudes up to 14,000 feet above sea level. At Albuquerque, N. Mex., the elevation of the river is 5,000 feet and it leaves the Territory at an elevation of about 4,000 feet.

The rainfall varies greatly from year to year and from source to mouth, its irregularity making it very difficult to give averages. The annual precipitation in the mountainous district of Colorado—that is, along the upper Rio Grande—ranges from 15 to 25 inches. In the northern part of New Mexico it ranges from 10 to 15 inches, and in the southern part from 5 to 12 inches.

In the mountains of Colorado the river is covered with a foot or more of ice from early in the winter until late in the spring. During severe winters the river is frozen over at times in northern New Mexico, and the snowfall is often very heavy. From the melting of the snows in Colorado and New Mexico comes the spring floods.

Irrigation is now practiced extensively in the following valleys along the Rio Grande and its smaller tributaries:

San Luis Valley, beginning a short distance above Del Norte and extending to the mouth of Conejos River. This district contains probably the largest cultivated area along the Rio Grande, aggregating nearly half a million acres.

Valleys of the Taos district, lying on the east side of the river below the Colorado line and including the valleys of Red River, Arroyo Hondo, and Taos. The Taos Valley surpasses the others both in water facilities and in area cultivated.

Espanola Valley, located south of the Taos district and Tres Piedras Mesa. It lies along the river, and, as in the Taos country, agriculture has been practiced for years.

Albuquerque district, including the valley from Pena Blanco to San Marcial. The system of irrigation is practically the same as the old Pueblo Indian system. In the last few years, however, new settlers have adopted progressive methods and have greatly increased the duty of water.

Mesilla Valley, next to San Luis Valley the most important agricultural area along the Rio Grande. The valley broadens just below Selden and continues generally broad and fertile for a distance of 35 miles or beyond the Texas line.

Along the Rio Grande and its tributaries in Colorado and New Mexico are available reservoir sites equal to storing of all flood waters. The largest reservoir in the country is about to be built near Engle, N. Mex. It will impound 2,500,000 acre-feet of water for the irrigation of nearly 200,000 acres of land in New Mexico, Texas, and Mexico.

The estimated power available on the Rio Grande and its tributaries, from its source to El Paso, Tex., is theoretically as follows:

Minimum horsepower	123,500
Minimum horsepower, six high months	241,000
Horsepower from storage, six months period	405,000

Developments will, however, be made chiefly on the upper tributaries in Colorado and a few of the mountain streams in New Mexico, and will not amount to more than 100,000 horsepower. At present very few water-power plants of any importance are operated in the drainage basin. The waters of the Rio Grande have been used only for irrigation and domestic purposes, but those of some of the tributaries have also been used in mining.

The years of greatest flow on the upper Rio Grande appear to be 1906 and 1907; 1902 and 1908 were low-water years.

The determination of the amount of water in the Rio Grande is of importance, both on account of its use in irrigation and from its bearing upon interstate and international distribution of water. Most of the New Mexico and all of the Texas stations down to Eagle Pass are maintained by the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission). The data used for the following stations have been collected by W. W. Follett, consulting engineer for the commission, and have been furnished through the courtesy of Gen. Anson Mills, commissioner:

Rio Grande near San Marcial, N. Mex.
Rio Grande near El Paso, Tex.
Rio Grande above Presidio, Tex.
Rio Grande below Presidio, Tex.
Rio Grande near Langtry, Tex.
Rio Grande at Eagle Pass, Tex.
Pecos River near Moorhead, Tex.
Devils River near Devils River Station, Tex.

On account of the shifting character of the river beds at the international water stations, no rating tables have been prepared. The estimated monthly discharges are from daily discharges computed by Mr. Follett directly from the discharge measurements.

The five stations from Laredo down (Laredo, Roma, Brownsville, Salado near Guerrero, and San Juan at Santa Rosalia ranch) are maintained by the Mexican section of the commission.

RIO GRANDE PROPER.

RIO GRANDE AT THIRTYMILE BRIDGE, NEAR CREEDE, COLO.

This station, which was established June 18, 1909, is about 30 miles west of Creede, Colo., and about 200 feet above the mouth of Big Squaw Creek at an elevation of about 9,200 feet above sea level.

No water is diverted above the station and none for many miles below except a little for meadow irrigation. The station is about one-half mile downstream from the proposed reservoir of the Farmers Union Irrigation Co., which will store flood water to irrigate land in the valley 70 miles downstream. The drainage area at the station is about 160 square miles. The records at this station have been taken at the expense of the company by its engineers under the general direction of the United States Geological Survey.

The chain gage, the datum of which has remained constant, is on the right bank 200 feet upstream from Thirtymile Bridge; discharge measurements are made from a cable 30 yards below the gage.

This stream is frozen over for a number of months each year and there is also a large snowfall in that locality.

Discharge measurements of Rio Grande at Thirtymile Bridge, near Creede, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 21	Pennock and Evans	.....	152	4.20	457
24	O. P. Pennock	.....	142	3.98	389
27	.....do	.....	128	3.70	318
July 18	.....do	.....	91	2.90	164
20	.....do	.....	85	2.80	146
21	.....do	.....	85	2.75	145
22	.....do	.....	83	2.70	135
26	.....do	.....	81	2.60	123
Aug. 3	.....do	.....	81	2.70	137
16	.....do	.....	68	2.47	105
24	.....do	.....	64	2.39	96
26	.....do	.....	60	2.25	85
27	.....do	.....	60	2.21	82
Sept. 8	.....do	.....	59	2.17	80
12[a]	I. G. Ferguson	37.4	51	2.17	56
12[a]	.....do	35.2	45	2.17	57
12[a]	.....do	34.8	45	2.17	57
Oct. 29	O. P. Pennock	.....	46	2.18	59
Nov. 21[a]	.....do	.....	52	2.28	64
25	.....do	.....	50	2.22	65
28	.....do	.....	53	2.33	73

[a] Made by wading.

Daily gage height, in feet, of Rio Grande at Thirtymile Bridge, near Creede, Colo., for 1910.

[O. P. Pennock, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3.6	2.9	2.35	2.1	2.0	16	.....	2.9	2.45	2.3	2.9	2.0
2	.....	3.5	2.75	2.25	2.2	2.0	17	.....	2.9	2.45	2.2	2.6	1.85
3	.....	3.45	2.65	2.55	2.25	2.1	18	4.15	2.85	2.4	2.25	2.5	1.9
4	.....	3.4	2.9	2.45	2.2	2.2	19	4.3	2.85	2.4	2.4	2.5	2.1
5	.....	3.4	3.25	2.3	2.15	2.0	20	4.3	2.8	2.4	2.45	2.35	1.85
6	.....	3.3	2.9	2.2	2.05	1.9	21	4.2	2.75	2.4	2.4	2.1	1.95
7	.....	3.25	2.75	2.2	2.05	1.9	22	4.1	2.75	2.35	2.45	2.3	2.0
8	.....	3.2	2.7	2.15	2.05	1.8	23	4.0	2.75	2.4	2.35	2.25	1.9
9	.....	3.1	2.7	2.15	2.05	1.9	24	3.9	2.7	2.4	2.25	2.25	2.0
10	.....	3.0	2.7	2.1	2.05	1.9	25	3.8	2.65	2.3	2.2	2.3	2.0
11	.....	3.0	2.75	2.1	2.0	1.95	26	3.7	2.6	2.25	2.2	2.35	1.95
12	.....	2.95	2.75	2.15	2.05	1.95	27	3.75	2.6	2.2	2.2	2.25	1.9
13	.....	3.0	2.6	2.4	2.0	2.05	28	4.2	2.8	2.2	2.15	2.1	1.9
14	.....	2.95	2.6	2.3	2.1	2.2	29	4.0	2.6	2.25	2.15	2.1	2.0
15	.....	2.95	2.5	2.3	2.2	2.05	30	3.65	3.3	2.2	2.1	2.0	1.95
							31	.....	3.35	2.4	.....	2.0	.....

Daily discharge, in second-feet, of Rio Grande at Thirtymile Bridge, near Creede, Colo., for 1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	291	149	76	51	43	16	.....	149	87	70	149	43
2	.....	267	126	65	60	43	17	.....	149	87	60	105	33
3	.....	256	112	99	65	51	18	448	141	81	65	93	36
4	.....	245	149	87	60	60	19	501	141	81	81	93	51
5	.....	245	213	70	56	43	20	501	133	81	87	76	33
6	.....	223	149	60	47	36	21	465	126	81	81	51	40
7	.....	213	126	60	47	36	22	431	126	76	87	70	43
8	.....	203	119	56	47	30	23	399	126	81	76	65	36
9	.....	183	119	56	47	36	24	369	119	81	65	65	43
10	.....	165	119	51	47	36	25	341	112	70	60	70	43
11	.....	165	126	51	43	40	26	315	105	65	60	76	40
12	.....	157	126	56	47	40	27	328	105	60	60	65	36
13	.....	165	105	81	43	47	28	465	133	60	56	51	36
14	.....	157	105	70	51	60	29	399	105	65	56	51	43
15	.....	157	93	70	60	47	30	303	223	60	51	43	40
							31	.....	234	81	.....	43	.....

NOTE.—These discharges are based on a rating curve that is well defined above 50 second-feet.

Monthly discharge of Rio Grande at Thirtymile Bridge near Creede, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
June 18–30	501	303	405	10,400	A.
July	291	105	172	10,600	A.
August	213	60	101	6.210	A.
September	99	51	67.4	4,010	A.
October	149	43	62.5	3,840	A.
November	60	33	41.5	2,470	B.

RIO GRANDE NEAR CREEDE, COLO.

The station, which was established April 24, 1907, is located at the three-span highway bridge a quarter of a mile south of Wason siding, on the Creede branch of the Denver & Rio Grande Railroad, about 3 miles from Creede, and is a few miles above the site of a proposed dam and reservoir. Willow Creek (Goblin Creek) enters the river a short distance upstream from Wason, and Goose Creek enters at Wagonwheel Gap, about 5 miles below. The drainage area above the station is about 700 square miles.

The chain gage is fastened to the downstream side of left span, and discharge measurements are also made from the same side. A Bristol automatic gage was installed at the bridge by the State engineer of Colorado on September 23, 1910. Readings of this gage have been referred to the datum of the chain gage.

Except for a little meadow irrigation, no water is diverted above this station. Two or three reservoirs are about to be constructed on the upper waters of the Rio Grande and its tributaries above Wason. Among others may be mentioned the Farmers' Union Irrigation

Co.'s reservoir on the main stream, about 35 miles above. The proposed reservoir near Wason will have a capacity almost equal to the normal annual flow of the river.

The winters are long and very severe in this locality, and the stream has a heavy ice cover for several months. The bridge piers cause eddies, which materially affect the accuracy of measurements. The river channel is rough and the velocity high at flood stages, so that results obtained at this station are only fair.

The datum of the gage has not been changed since the station was established.

Discharge measurements of Rio Grande near Creede, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25[a]	J. B. Stewart	69	122	.....	169
Feb. 21[b]	G. H. Russell	65	93	.....	152
Apr. 14	....do	99	217	1.10	548
May 24	....do	116	366	2.37	1,560
June 26	....do	108	274	1.51	788
Aug. 2	....do	94	187	.80	396
13	Christianson and Grieve	100	191	.78	363
Sept. 1	I. G. Ferguson	109	168	.55	277
23[c]	....do	68	140	.50	233
Oct. 10	E. O. Christianson	90	143	.30	210
20	Christianson and Hezmalhalch	110	169	.60	290
Dec. 10	G. H. Russell	67	124	.31	180

[a] Made by wading. Ice. [b] Ice. [c] Made by wading.

Daily gage height, in feet, of Rio Grande near Creede, Colo., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.45	1.25	2.35	4.55	1.45	0.95	0.5	0.4	0.45	0.3
2	.....	.45	1.35	2.35	4.45	1.4	.85	.5	.4	.45	.3
3	.....	.45	1.15	2.5	3.6	1.3	.8	.5	.4	.4	.3
4	.....	.5	1.2	2.55	3.6	1.2	.7	.5	.4	.5	.25
5	.....	.5	1.15	2.6	3.7	1.2	.9	.5	.35	.5	.3
6	.....	.5	1.0	2.5	3.5	1.2	1.2	.5	.35	.4	.3
7	.....	.5	1.0	2.75	3.25	1.1	.9	.5	.35	.4	.3
8	.....	.5	1.05	3.15	3.05	1.1	.....	.5	.35	.4	.3
9	.....	.55	1.1	4.0	3.15	1.0	.8	.55	.3	.35	.3
10	.....	.55	1.2	4.15	2.8	.95	.75	.55	.3	.35	.3
11	.....	.6	1.3	3.85	2.9	.95	.8	.55	.3	.4	.25
12	.....	.6	1.4	3.45	2.45	.95	.85	.55	.3	.4	.25
13	.....	.65	1.35	3.15	2.5	.9	.75	.55	.3	.4	.3
14	.....	.9	1.0	2.9	2.55	.9	.75	.5	.35	.4	.2
15	.....	1.1	1.05	2.75	2.45	.8	.7	.5	.35	.4	.15
16	.....	1.3	.9	2.85	2.3	.75	.7	.5	.7	.35	.15
17	.....	1.3	.95	2.95	2.15	.8	.6	.5	1.2	.25	.15
18	.....	1.25	1.0	2.85	2.05	.8	.6	.55	.7	.25	.1
19	.....	1.25	1.2	2.95	1.95	.85	.6	.5	.6	.4	.05
20	.....	1.25	1.5	2.85	2.0	.8	.5	.52	.55	.25	.15
21	.....	1.3	1.7	2.95	1.9	.75	.6	.5	.45	.2	.15
22	.....	1.3	1.65	3.0	1.95	.7	.55	.5	.5	.35	.15
23	.....	1.25	1.9	2.95	1.75	.7	.5	.5	.5	.35	.25
24	.....	1.35	1.95	2.6	1.7	.65	.55	.5	.5	.4	.3
25	0.45	1.35	2.1	2.75	1.55	.65	.5	.5	.5	.45	.2
26	.45	1.40	2.45	2.6	1.5	.7	.6	.45	.5	.4	.2
27	.45	1.4	2.7	2.4	1.6	.6	.5	.4	.5	.35	.2
28	.45	1.4	2.95	3.1	1.7	.65	.5	.4	.45	.3	.15
29	.....	1.5	3.15	3.4	1.7	.6	.5	.4	.45	.35	.....
30	.....	1.4	3.15	4.25	1.6	.8	.5	.35	.45	.35	.....
31	.....	1.4	.....	4.6	.....	1.15	.5	.....	.45	.....	.....

NOTE.—Ice Jan. 1–Feb. 24 and Dec. 29–31.

Daily discharge, in second-feet, of Rio Grande near Creede, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	222	618	1,500	4,360	748	445	240	205	222	175
2	222	682	1,500	4,200	715	395	240	205	222	175
3	222	555	1,660	3,020	650	370	240	205	205	175
4	240	585	1,720	3,020	585	330	240	205	240	161
5	240	555	1,770	3,150	585	420	240	190	240	175
6	240	470	1,660	2,880	585	585	240	190	205	175
7	240	470	1,940	2,550	525	420	240	190	205	175
8	240	498	2,420	2,300	525	400	240	190	205	175
9	260	525	3,560	2,420	470	370	260	175	190	175
10	260	585	3,770	2,000	448	348	260	175	190	175
11	280	650	3,350	2,120	448	370	260	175	205	161
12	280	715	2,810	1,610	448	395	260	175	205	161
13	302	682	2,420	1,660	420	348	260	175	205	175
14	420	470	2,120	1,720	420	348	240	190	205	147
15	525	498	1,940	1,610	370	325	240	190	205	134
16	650	420	2,060	1,450	348	325	240	325	190	134
17	650	445	2,180	1,300	370	280	240	585	161	134
18	618	470	2,060	1,210	370	280	260	325	161	121
19	618	585	2,180	1,120	395	280	240	280	205	109
20	618	780	2,060	1,160	370	240	248	260	161	134
21	650	915	2,180	1,080	348	280	240	222	147	134
22	650	880	2,240	1,120	325	260	240	240	190	134
23	618	1,080	2,180	955	325	240	240	240	190	161
24	682	1,120	1,770	915	302	260	240	240	205	175
25	682	1,260	1,940	812	302	240	240	240	222	147
26	715	1,610	1,770	780	325	280	222	240	205	147
27	715	1,880	1,560	845	280	240	205	240	190	147
28	715	2,180	2,360	915	302	240	205	222	175	134
29	780	2,420	2,745	915	280	240	205	222	190	125
30	715	2,420	3,910	845	370	240	190	222	190	125
31	715	.....	4,430	.....	555	240	.....	222	.....	125

NOTE.—These discharges are based on a rating curve that is well defined below 4,300 second-feet. Aug. 8 interpolated. Dec. 29–31 estimated on account of ice.

Monthly discharge of Rio Grande near Creede, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	180	11,100	D.
February	.....	.....	150	8,330	D.
March	780	222	483	29,700	A.
April	2,420	420	901	53,600	A.
May	4,430	1,500	2,320	143,000	A.
June	4,360	780	1,800	107,000	A.
July	748	280	436	26,800	A.
August	585	240	324	19,900	A.
September	260	190	238	14,200	A.
October	585	175	231	14,200	A.
November	240	147	198	11,800	A.
December	175	.....	152	9,350	B.
The year	4,430	.....	619	449,000	

NOTE.—Mean discharge for January and February estimated on the basis of two measurements.

RIO GRANDE NEAR DEL NORTE, COLO.

This station, which was established in the fall of 1889, was originally located about 2 miles above Del Norte, and records were taken more or less continuously until May 16, 1908, when a new station was established at the new State highway bridge about 6 miles above Del Norte, near the upper edge of the San Luis Valley. Some inflow

takes place between the two points at certain seasons of the year, so that the mean annual flow at the State bridge is somewhat less than that at the old station. The new station is about 4 miles above the mouth of Los Pinos Creek, below the mouth of Wolf Creek, and about 10 miles below the mouth of the South Fork of the Rio Grande. The drainage area is 1,440 square miles. The old station is just above the mouth of Los Pinos Creek.

The diversions from the Rio Grande and its tributaries above this point are all small and are used chiefly for meadow irrigation. They represent a very small percentage of the total flow of the stream. The largest ditch takes water out at Del Norte, about 2 miles below the original station. From this canal and many others diverted at various points nearly 300,000 acres of land in Colorado are now being irrigated from the Rio Grande.

Numerous small storage reservoirs under construction or in contemplation on the tributaries of the Rio Grande will store a large proportion of flood waters, but all the waters of the upper Rio Grande have been filed upon.

Practically no change was made in the datum of the gage at the old station during its maintenance, and this old gage is still being used by the water commissioner in that irrigation district of the State. The present chain gage is located on the highway bridge, and the readings have no determined relation to those taken at the old gage. On November 8, 1910, the State engineer established a Bristol automatic gage on the right bank a short distance upstream from the bridge. The readings of this gage have been referred to the datum of the chain gage. Discharge measurements are made from the downstream side of the bridge.

Very good results can be obtained at the present station except during the three or four winter months when the flow is affected by ice.

Discharge measurements of Rio Grande near Del Norte, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25[a]	J. B. Stewart	152	200	0.60	314
Feb. 22[a]	Thos. Grieve	140	180	2.65	291
22[a]	G. H. Russell	140	177	2.65	283
Mar. 17[a]	Thos. Grieve	167	341	1.28	618
Apr. 8	Thos. Grieve	168	396	1.66	896
15	G. H. Russell	176	402	1.60	918
May 23	.....do	174	584	2.79	2,410
June 27	.....do	168	430	1.87	1,080
July 31	.....do	166	367	1.41	736
Aug. 8	Christianson and Grieve	159	325	1.18	551
10	.....do	159	317	1.15	532
Sept. 7	I. G. Ferguson	154	258	.80	320
Oct. 18	Christianson and Hezmalhalch	166	313	1.14	492
Dec. 11	G. H. Russell	135	252	.78	296

[a] Ice.

Daily gage height, in feet, of Rio Grande near Del Norte, Colo., for 1910.

[James G. Duncan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	1.3	3.4	4.2	1.8	1.4	0.95	0.75	0.9	0.6
2	.....	2.6	2.7	1.3	3.2	4.1	1.65	1.25	.95	.8	.9	.6
3	.....	.....	.....	1.4	3.0	4.1	1.6	1.15	.9	.8	.9	.65
4	.....	2.6	2.7	1.35	2.9	4.0	1.55	1.05	.9	.8	.9	.65
5	.....	.....	.....	1.35	3.15	3.8	1.55	1.35	.9	.75	.9	.7
6	.....	2.6	2.7	1.4	2.95	3.65	1.5	1.4	.85	.75	.9	.5
7	.....	.....	.....	1.45	3.05	3.45	1.45	1.25	.8	.75	.9	.5
8	.....	2.5	1.4	1.6	3.25	3.3	1.4	1.15	.8	.75	.85	.55
9	.....	.....	1.25	1.6	3.65	3.2	1.35	1.15	.75	.7	.85	.65
10	.....	2.5	1.2	1.6	4.0	3.1	1.3	1.15	.75	.7	.85	.65
11	.....	.....	1.15	1.75	4.3	2.95	1.3	1.15	.75	.7	.85	.7
12	.....	2.5	1.05	1.8	4.4	2.9	1.3	1.3	.75	.7	.85	.7
13	.....	.....	1.15	1.8	4.15	2.85	1.3	1.25	.75	.7	.8	.65
14	.....	2.5	1.15	1.75	4.0	2.8	1.3	1.2	.75	.7	.85	.6
15	.....	.....	1.2	1.55	3.5	2.8	1.3	1.2	.8	.7	.85	.5
16	.....	2.6	1.2	1.45	3.45	2.8	1.2	1.1	.85	.85	.75	.55
17	.....	.....	1.25	.....	3.3	2.55	1.15	1.05	.85	1.4	.7	.5
18	.....	2.6	1.3	1.6	3.25	2.4	1.15	1.0	.8	1.15	.65	.5
19	.....	.....	1.4	1.7	3.2	2.35	1.15	1.0	.8	1.1	.75	.5
20	.....	2.6	1.4	1.95	3.2	2.3	1.1	1.0	.95	1.0	.7	.55
21	.....	.....	1.5	2.2	3.1	2.25	1.1	1.05	.9	.9	.6	.55
22	.....	2.65	1.6	2.15	2.9	2.2	1.05	1.05	.9	.95	.65	.6
23	.....	.....	1.85	2.2	2.75	2.1	1.05	1.0	.9	.95	.65	.55
24	.....	2.6	1.85	2.4	2.7	2.0	1.1	1.0	.85	.95	.75	.6
25	2.6	.....	1.95	2.65	2.95	1.9	1.1	1.0	.8	1.0	.65	.6
26	.....	2.6	1.85	2.95	3.0	1.85	1.05	.95	.8	1.0	.65	.6
27	2.4	.....	1.6	3.35	3.15	1.85	1.0	.9	.75	1.0	.65	.6
28	.....	2.7	1.55	3.4	3.6	1.8	.95	.85	.75	1.0	.6	.6
29	2.4	.....	1.5	3.7	4.15	1.95	1.0	.8	.75	.95	.65	.....
30	.....	.....	1.4	3.7	4.3	1.9	1.1	.9	.75	.9	.55	.....
31	2.4	.....	1.3	.....	4.35	.....	1.4	.85	.....	.9	.....	.....

NOTE.—River frozen over from Jan. 1 to Mar. 7 and Dec. 29 to 31. Ice averaged 2.2 feet thick during January and February.

Daily discharge, in second-feet, of Rio Grande near Del Norte, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	635	3,320	4,840	1,060	710	398	295	370	225
2	.....	635	2,970	4,630	920	598	398	320	370	225
3	.....	710	2,640	4,630	875	525	370	320	370	248
4	.....	674	2,490	4,430	832	458	370	320	370	248
5	.....	674	2,880	4,050	832	672	370	295	370	270
6	.....	710	2,560	3,770	790	710	345	295	370	180
7	.....	750	2,720	3,410	750	598	320	295	370	180
8	710	875	3,060	3,140	710	525	320	295	345	202
9	598	875	3,770	2,970	672	525	295	270	345	248
10	560	875	4,430	2,800	635	525	295	270	345	248
11	525	1,010	5,050	2,560	635	525	295	270	345	270
12	458	1,060	5,260	2,490	635	635	295	270	345	270
13	525	1,060	4,740	2,420	635	598	295	270	320	248
14	525	1,010	4,430	2,340	635	560	295	270	345	225
15	560	832	3,500	2,340	635	560	320	270	345	180
16	560	750	3,410	2,340	560	490	345	345	295	202
17	598	810	3,140	1,970	525	458	345	710	270	180
18	635	875	3,060	1,760	525	425	320	525	248	180
19	710	965	2,970	1,690	525	425	320	490	295	180
20	710	1,210	2,970	1,620	490	425	398	425	270	202
21	790	1,490	2,800	1,560	490	458	370	370	225	202
22	875	1,430	2,490	1,490	458	458	370	395	248	225
23	1,110	1,490	2,260	1,370	458	425	370	395	248	202
24	1,110	1,760	2,190	1,260	490	425	345	395	295	225
25	1,210	2,120	2,560	1,160	490	425	320	425	248	225
26	1,110	2,560	2,640	1,110	458	398	320	425	248	225
27	875	3,230	2,880	1,110	425	370	295	425	248	225
28	832	3,320	3,680	1,060	398	345	295	425	225	225
29	790	3,860	4,740	1,210	425	320	295	395	248	.....
30	710	3,860	5,050	1,160	490	370	295	370	202	.....
31	635	.....	5,160	.....	710	345	.....	370	.....	.....

NOTE.—These discharges are based on a rating curve that is fairly well defined. Discharge for Apr. 17 interpolated.

Monthly discharge of Rio Grande near Del Norte, Colo., for 1910.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	.....	.....	321	0.229	0.26	19,700
February	.....	.....	293	.209	.22	16,300
March	1,210	.....	646	.461	.53	39,700
April	3,860	635	1,400	1.00	1.12	83,300
May	5,260	2,190	3,410	2.44	2.81	210,000
June	4,840	1,060	2,420	1.73	1.93	144,000
July	1,060	398	618	.441	.51	38,000
August	710	320	493	.352	.41	30,300
September	398	295	333	.238	.27	19,800
October	710	270	362	.259	.30	22,300
November	370	202	305	.218	.24	18,100
December	270	.....	218	.156	.18	13,400
The year	5,260	.....	905	.646	8.78	655,000

NOTE.—Discharge Jan. 1–Mar. 7 and Dec. 29–31 estimated on account of ice conditions.

RIO GRANDE NEAR LOBATOS, COLO.

This station was established June 28, 1899, at the State bridge about 15 miles east of Antonito, in T. 33 N., R. 11 E., a few miles above the Colorado-New Mexico line. The data are valuable in connection with the proposed Engle reservoir of the United States Reclamation Service, and will be used in the adjudication, which must eventually be made, of all water rights along the Rio Grande.

Conejos River enters about 7 miles above the station. A large part of the normal flow of the river is diverted above this station during the irrigation period. About 450,000 acres of land are irrigated, and more will be put under water in connection with some of the proposed reservoir systems above.

Ice forms on the river at this point for about three months during the winter, but open water may prevail through part of this period.

The datum of the gage has not been changed since the station was established. The present chain gage is fastened to downstream handrail of bridge. Measurements are also made from downstream side of this bridge. On March 23, 1910, the State engineer of Colorado established a Bristol automatic gage at the bridge, which was used to some extent during the season and the readings of which have been referred to chain-gage datum. Very good results have been obtained at this station. The river channel is fairly permanent, being a gash cut in the lava rock. Occasionally during low water some sediment is deposited, but it is scoured out in times of flood.

Discharge measurements of Rio Grande near Lobatos, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 27[a]	J. B. Stewart	212	323	2.65	438
Feb. 23	G. H. Russell	214	273	2.70	366
Apr. 9	W. B. Freeman	239	596	2.68	1,210
May 26	G. H. Russell	235	585	2.68	1,220
June 24	....do	215	272	1.20	138
July 15	J. B. Stewart	43.5	21.8	.65	24
Aug. 19	Ferguson and Christianson	115	118	1.15	124
Sept. 10	Comstock and Christianson	95	69	.75	42
Oct. 13	J. B. Stewart	51	44	.88	51
Nov. 8	Mathias	125	159	1.40	212
Dec. 13[a]	G. H. Russell	230	400	1.86	331

[a] Ice.

Daily gage height, in feet, of Rio Grande near Lobatos, Colo., for 1910.

[Roman Mondragon, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.75	2.7	2.9	2.7	5.5	4.2	1.0	0.7	0.8	0.8	1.4	1.55
2	2.75	2.7	2.7	2.7	5.45	4.35	.9	.6	.8	.7	1.4	1.6
3	2.2	2.6	2.2	2.7	5.1	4.2	.9	.6	.8	.7	1.4	1.6
4	2.3	2.6	2.2	2.7	4.7	3.9	.9	.6	.7	.8	1.4	1.65
5	2.35	2.6	2.3	2.7	4.55	3.7	.8	.7	.7	.8	1.4	1.55
6	2.35	2.6	2.3	2.7	4.3	3.6	.8	.7	.7	.8	1.4	1.25
7	2.35	2.5	2.45	2.7	4.2	3.4	.7	.7	.7	.8	1.4	1.65
8	2.4	2.6	2.6	2.65	4.1	2.85	.7	.7	.7	.8	1.4	1.85
9	2.8	2.5	2.6	2.7	4.15	2.65	.7	.7	.8	.8	1.3	1.85
10	2.35	2.7	2.65	2.75	4.35	2.45	.7	.75	.75	.8	1.3	1.8
11	2.45	2.6	2.7	2.75	4.7	2.35	.7	.85	.75	.85	1.3	1.75
12	2.35	2.6	2.55	2.85	5.0	2.25	.7	.9	.75	.85	1.3	1.75
13	2.45	2.4	2.55	3.1	5.25	2.25	.7	1.0	.75	.8	1.35	1.9
14	2.5	2.3	2.7	3.1	5.4	2.15	.7	1.1	.8	.8	1.35	1.8
15	2.35	2.2	2.7	3.1	5.35	2.05	.7	1.2	.8	.9	1.35	2.3
16	2.6	2.1	2.7	3.05	5.4	1.95	.6	1.2	.8	.9	1.35	2.0
17	2.9	2.2	2.7	3.0	5.15	1.8	.6	1.15	.8	.9	1.4	1.9
18	2.8	2.5	2.65	3.0	4.7	1.7	.6	1.2	.8	.9	1.5	1.9
19	2.8	2.6	2.7	2.9	3.85	1.5	.6	1.2	.8	1.0	1.55	1.9
20	2.9	2.6	2.75	3.1	3.7	1.55	.6	1.2	.8	1.3	1.5	2.05
21	2.9	2.7	2.8	3.2	3.65	1.4	.6	1.1	.9	1.3	1.5	2.0
22	2.9	2.7	2.9	3.45	3.4	1.45	.6	1.1	.9	1.4	1.55	2.15
23	2.9	2.7	2.9	3.45	3.25	1.35	.6	1.1	.85	1.5	1.55	1.9
24	2.8	2.7	3.1	3.55	3.05	1.35	.6	1.0	.85	1.5	1.55	1.85
25	2.8	2.8	3.3	3.85	2.85	1.3	.6	1.0	.8	1.5	1.6	2.05
26	2.7	2.8	3.35	4.15	2.7	1.15	.6	1.0	.75	1.5	1.65	1.95
27	2.7	2.8	3.3	4.55	2.85	1.0	.6	1.0	.8	1.5	1.6	1.95
28	2.6	2.8	3.15	4.75	3.05	1.0	.6	.9	.8	1.5	1.6	1.0
29	2.65	.....	3.1	5.15	3.25	1.0	.6	.9	.8	1.5	1.6	.....
30	3.0	.....	2.95	5.45	3.55	1.0	.65	.85	.8	1.5	1.55	.....
31	2.7	.....	2.8	.....	4.05	.....	.95	.85	.....	1.5	.....	.....

NOTE.—Ice Jan. 1 to about Mar. 2 and about Dec. 6 to 31.

Daily discharge, in second-feet, of Rio Grande near Lobatos, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,230	5,360	3,300	85	30	45	45	205	272
2	.....	1,230	5,280	3,530	65	20	45	30	205	295
3	705	1,230	4,710	3,300	65	20	45	30	205	295
4	705	1,230	4,070	2,840	65	20	30	45	205	320
5	800	1,230	3,840	2,560	45	30	30	45	205	272
6	800	1,230	3,450	2,410	45	30	30	45	205	250
7	950	1,230	3,300	2,130	30	30	30	45	205	250
8	1,110	1,170	3,140	1,410	30	30	30	45	205	300
9	1,110	1,230	3,220	1,170	30	30	45	45	165	300
10	1,170	1,290	3,530	950	30	38	38	45	165	300

Daily discharge, in second-feet, of Rio Grande near Lobatos, Colo., for 1910.—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	1,230	1,290	4,070	850	30	55	38	55	165	300
12	1,060	1,410	4,550	752	30	65	38	55	165	300
13	1,060	1,730	4,950	752	30	85	38	45	185	330
14	1,230	1,730	5,200	660	30	110	45	45	185	330
15	1,230	1,730	5,110	572	30	135	45	65	185	330
16	1,230	1,660	5,200	495	20	135	45	65	185	300
17	1,230	1,600	4,790	400	20	122	45	65	205	300
18	1,170	1,600	4,070	345	20	135	45	65	250	300
19	1,230	1,470	2,770	250	20	135	45	85	272	300
20	1,290	1,730	2,560	272	20	135	45	165	250	300
21	1,350	1,860	2,480	205	20	110	65	165	250	300
22	1,470	2,200	2,130	228	20	110	65	205	272	300
23	1,470	2,200	1,920	185	20	110	55	250	272	300
24	1,730	2,340	1,660	185	20	85	55	250	272	300
25	1,990	2,770	1,410	165	20	85	45	250	295	300
26	2,060	3,220	1,230	122	20	85	38	250	320	250
27	1,990	3,840	1,410	85	20	85	45	250	295	250
28	1,800	4,150	1,660	85	20	65	45	250	295	250
29	1,730	4,790	1,920	85	20	65	45	250	295	250
30	1,540	5,280	2,340	85	24	55	45	250	272	250
31	1,350	.....	3,060	.....	75	55	.....	250	.....	250

NOTE.—These discharges are based on a rating curve that is well defined below 4,600 second-feet.

Monthly discharge of Rio Grande near Lobatos, Colo., for 1910.

[Drainage area, 7,700 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	390	0.051	0.06	24,000	C.
February	.....	.....	355	.046	.05	19,700	C.
March	2,060	.....	1,240	.161	.18	76,200	A.
April	5,380	1,170	2,030	.264	.29	121,000	A.
May	5,380	1,230	3,370	.438	.50	207,000	A.
June	3,530	85	1,010	.131	.15	60,100	A.
July	85	20	32.9	.0043	.005	2,020	A.
August	135	20	74.2	.0096	.01	4,560	A.
September	65	30	43.3	.0056	.006	2,580	A.
October	250	30	121	.016	.02	7,440	A.
November	320	165	228	.030	.03	13,600	A.
December	.....	.....	289	.038	.04	17,800	C.
The year	5,380	.....	769	.100	1.34	556,000	

NOTE.—Discharges Jan. 1 to Mar. 7 and Dec. 29 to 31 estimated on account of ice.

RIO GRANDE AT RIO GRANDE NEAR BUCKMAN, N. MEX.

This station was established February 1, 1895, since which time records have been obtained at various points. It is located at the Denver & Rio Grande Railroad bridge crossing the river one-eighth mile east of Rio Grande (a water-tank station). The bridge is about 4 miles above Buckman, a lumber camp, and about 2 miles below San Ildefonso, an Indian pueblo.

The original gage was located on left bank 180 feet above the bridge. On March 30, 1904, a vertical rod gage was established at a new datum on the downstream side of the railroad pier. The datum was discontinued December 31, 1905, and was reestablished

June 22, 1909, the same gage being used as in 1904. In June, 1910, a Friez automatic gage was installed at same location and datum as staff gage. The cable above bridge had been removed and measurements were made from railroad bridge. From June 22, 1909, to June, 1910, discharge measurements were made from the railroad bridge. During 1910 a cable was installed about 3 miles below. There are no diversions or important tributaries between the gage and the measuring section.

For many miles above this station many large and small ditches divert water for irrigation.

The flow of the stream at this point is only slightly affected by ice. Since 1904 the datum has remained practically unchanged.

Discharge measurements of Rio Grande near Buckman, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17	C. D. Miller	195	389	3.08	1,230
July 23[a]	do	81	95.8	[b]1.05	149
Aug. 11[a]	do	120	174	1.75	336
18	J. B. Stewart	90	191	1.77	369
Oct. 26	do	126	257	2.20	603
Nov. 26	C. B. Digby	133	216	[b]2.0	524
Dec. 27	do	119	256	2.14	548

[a] Wading measurement.
[b] Gage height taken from adjusted register sheet.

Daily gage height, in feet, of Rio Grande near Buckman, N. Mex., for 1910.

[Aaron Martínez and J. B. Espinosa, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.25	2.15	3.7	4.5	9.3	5.5	1.9	1.6	1.8	.....	2.2	2.0
2	2.35	2.25	4.1	4.4	9.15	5.7	1.4	1.6	1.8	.....	2.15	1.95
3	2.45	2.25	4.1	4.35	8.75	5.75	1.2	1.55	1.75	.....	2.25	1.9
4	2.65	2.05	4.55	4.45	8.35	5.7	1.2	1.55	1.5	.....	2.5	1.95
5	2.45	1.9	4.7	4.4	7.95	5.55	1.2	1.6	1.4	.....	2.4	1.95
6	2.25	1.95	4.8	4.4	7.95	5.35	1.15	1.6	1.35	.....	2.35	1.95
7	2.35	1.85	4.55	4.45	7.7	5.15	1.05	1.6	1.3	.....	2.25	1.95
8	2.05	1.8	4.5	4.55	7.65	4.9	1.0	1.6	1.3	.....	2.3	1.95
9	2.0	1.75	4.65	4.55	7.45	4.5	1.05	1.75	1.2	.....	2.3	1.95
10	1.9	1.8	4.7	5.05	7.1	4.1	1.1	1.8	1.1	.....	2.25	2.05
11	1.85	1.9	4.55	5.2	7.85	3.9	1.1	2.0	1.1	.....	2.1	2.15
12	1.95	2.0	4.3	5.05	7.25	3.8	1.1	2.5	1.1	.....	2.0	2.2
13	2.0	2.1	4.4	5.25	7.5	3.6	1.2	2.1	1.1	.....	1.95	2.25
14	2.0	2.2	4.3	5.45	7.8	3.5	1.3	2.2	1.1	.....	1.95	2.2
15	1.9	2.05	4.5	5.65	8.1	3.4	1.15	2.0	1.1	.....	2.0	2.25
16	1.95	2.05	4.55	5.55	8.1	3.3	1.25	1.9	1.1	.....	2.0	2.15
17	2.15	1.95	4.55	5.35	7.7	3.1	1.15	1.9	1.1	.....	2.0	2.0
18	2.15	1.85	4.7	5.25	7.4	2.95	1.1	1.75	1.15	.....	2.0	2.05
19	2.25	1.85	4.7	5.15	7.0	2.9	1.0	1.75	1.5	.....	2.0	1.95
20	2.3	1.85	4.85	5.5	6.45	2.8	1.0	1.75	1.85	.....	2.0	1.95
21	2.2	1.85	5.05	5.8	5.55	2.65	1.0	1.8	1.6	.....	2.0	1.9
22	2.05	2.0	5.05	6.35	5.3	2.5	1.0	1.8	2.0	.....	2.0	1.75
23	2.05	2.1	5.3	6.35	5.3	2.5	.9	1.6	2.2	.....	1.95	1.7
24	2.25	2.05	5.4	6.6	5.3	3.1	1.0	1.6	.....	.....	2.0	1.95
25	2.3	7.2	5.6	7.1	4.95	3.15	1.05	1.6	.....	2.05	2.0	2.1
26	2.15	2.3	5.45	7.8	4.75	3.0	1.3	1.5	.....	2.1	2.0	2.15
27	2.15	2.8	5.35	8.35	4.5	2.85	1.3	1.4	.....	2.25	2.0	2.15
28	2.05	3.1	5.1	8.45	4.25	2.2	1.1	1.4	.....	2.3	2.0	2.1
29	2.25	.....	5.05	9.0	3.95	1.85	1.0	1.4	.....	2.2	2.0	2.1
30	2.1	.....	4.65	9.25	4.05	2.1	1.3	1.4	.....	2.2	2.0	2.1
31	1.95	.....	4.45	.....	4.75	.....	1.6	1.4	.....	2.2	.....	2.2

NOTE.—Gage heights after June were taken from Friez automatic register sheets and corrected for inaccuracies in gage setting. They are therefore uncertain.

Daily discharge, in second-feet, of Rio Grande near Buckman, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	672	601	2,040	2,960	12,500	4,320	440	295	386	.....	636	500
2	747	672	2,480	2,840	12,100	4,640	230	295	386	.....	601	470
3	825	672	2,480	2,780	11,100	4,720	180	278	362	.....	672	440
4	995	533	3,020	2,900	10,100	4,640	180	278	260	.....	865	470
5	825	440	3,210	2,840	9,120	4,400	180	295	230	.....	785	470
6	672	470	3,340	2,840	9,120	4,100	169	295	218	.....	747	470
7	747	413	3,020	2,900	8,540	3,800	148	295	205	.....	672	470
8	533	386	2,960	3,020	8,430	3,470	138	295	205	.....	709	470
9	500	362	3,140	3,020	7,990	2,960	148	362	180	.....	709	470
10	440	386	3,210	3,660	7,240	2,480	158	386	158	.....	672	533
11	413	440	3,020	3,870	8,880	2,260	158	500	158	.....	566	601
12	470	500	2,720	3,660	7,560	2,150	158	865	158	.....	500	636
13	500	566	2,840	3,940	8,100	1,930	180	566	158	.....	470	672
14	500	636	2,720	4,240	8,770	1,830	218	636	158	.....	470	636
15	440	533	2,960	4,560	9,470	1,720	169	500	158	.....	500	672
16	470	533	3,020	4,400	9,470	1,620	192	440	158	.....	500	601
17	601	470	3,020	4,100	8,540	1,420	169	440	158	.....	500	500
18	601	413	3,210	3,940	7,880	1,270	158	362	169	.....	500	533
19	672	413	3,210	3,800	7,030	1,220	138	362	260	.....	500	470
20	709	413	3,400	4,320	5,950	1,130	138	362	413	.....	500	470
21	636	413	3,660	4,800	4,400	995	138	386	295	.....	500	440
22	533	500	3,660	5,770	4,020	865	138	386	500	.....	500	361
23	533	566	4,020	5,770	4,020	865	120	295	636	.....	470	337
24	672	533	4,170	6,230	4,020	1,420	138	295	.....	.....	500	470
25	709	636	4,480	7,240	3,540	1,470	148	295	.....	533	500	566
26	601	709	4,240	8,770	3,280	1,320	205	260	.....	566	500	601
27	601	1,130	4,100	10,100	2,960	1,180	205	230	.....	672	500	601
28	533	1,420	3,730	10,300	2,660	636	158	230	.....	709	500	566
29	672	.....	3,660	11,700	2,320	413	138	230	.....	636	500	566
30	566	.....	3,140	12,300	2,420	566	205	230	.....	636	500	566
31	470	.....	2,900	.....	3,280	.....	295	230	.....	636	.....	636

NOTE.—These discharges are based on a rating curve that is fairly well defined below 5,100 second-feet.

Monthly discharge of Rio Grande near Buckman, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	995	413	608	37,400	B.
February	1,420	362	563	31,300	B.
March	4,480	2,040	3,250	200,000	B.
April	12,300	2,780	5,120	305,000	B.
May	12,400	2,320	6,930	426,000	B.
June	4,720	413	2,190	130,000	C.
July	440	120	179	11,000	C.
August	865	230	360	22,100	C.
Sept. 1–23	636	158	259	11,800	C.
Oct. 25–31	709	533	627	8,710	C.
November	865	470	568	33,800	C.
December	672	440	525	32,300	C.
The period	.....	.....	.....	1,250,000	

RIO GRANDE NEAR SAN MARCIAL, N. MEX.

On August 8, 1889, a station was established near San Marcial and a measurement made giving a discharge of 19 second-feet. Soon after this date the gage was destroyed and the station abandoned until January 29, 1895, when it was reestablished at the Atchison, Topeka & Santa Fe Railway bridge crossing the river 1 mile south of San Marcial, N. Mex. The inclined gage installed in 1895 was carried

away in 1896 and a wire gage put in its place at the same datum. This was soon abandoned and gage heights were obtained by measuring, by means of a graduated rod, the distance from the bridge deck to the water surface.

Since January 1, 1901, the station has been maintained by the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

The channel is sandy and very shifting. During high stages bridge piers interfere with the accuracy of results.

No important tributaries enter in the immediate vicinity.

Discharge measurements of Rio Grande near San Marcial, N. Mex., in 1910.

[By George W. King.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. feet.*	*Feet.*	*Sec.-ft.*
Jan. 1	323	11.4	1,627	June 12	256	10.5	940
4	308	11.5	1,527	15	238	10.0	879
7	317	11.55	276	18	149	9.7	333
10	161	10.55	472	21	108	9.5	192
13	198	10.7	988	24	42	9.1	69
16	274	11.0	1,157	27	30	8.7	34
19	284	10.9	1,370	30	31	8.9	42
22	265	10.9	1,204	July 14	58	9.3	183
25	236	10.7	883	17	8	8.5	7
28	210	10.8	832	29	20	8.9	35
31	200	10.7	777	31	3	8.5	4
Feb. 3	248	10.8	893	Aug. 3	72	9.5	151
6	216	10.8	830	6	41	9.3	95
9	236	10.7	681	9	20	9.0	43
12	177	10.6	680	11	244	10.3	710
16	152	10.7	527	14	22	9.2	30
19	199	10.9	637	17	6	8.4	7
22	303	10.8	653	20	4	8.4	4
25	244	10.9	748	24	43	9.3	70
28	408	11.1	1 267	28	61	9.4	84
Mar. 3	344	11.1	1,502	31	91	9.5	168
6	357	11.1	1,805	Sept. 1	231	10.5	786
9	518	11.5	2,176	4	20	8.9	25
12	412	11.3	2,315	7	4	8.6	3
15	430	11.4	2,471	20	12	8.9	12
18	432	11.4	2,262	24	62	9.65	117
21	381	11.3	2,260	26	8	8.7	9
24	453	11.8	2,704	28	5	8.4	4
27	539	11.8	3,298	Oct. 22	10	8.7	13
30	615	11.6	3,096	25	12	8.7	19
Apr. 3	473	11.2	2,053	28	16	8.7	34
6	534	11.3	2,353	31	13	8.7	28
9	550	11.4	2,228	Nov. 3	23	8.8	53
12	491	11.5	2,121	6	26	9.0	62
16	574	11.9	3,382	9	62	9.4	101
20	536	11.7	2,524	12	66	9.4	126
23	791	12.4	4,182	15	82	9.5	152
26	772	12.5	4,641	18	77	9.7	141
29	1,053	12.8	7,129	21	91	9.7	179
May 4	1,191	13.1	7,989	24	91	9.8	194
7	1,051	12.7	6,560	27	112	10.0	269
10	898	12.2	5,366	30	128	10.1	311
13	888	12.1	4,728	Dec. 3	140	10.3	342
16	1,179	12.6	6,571	6	141	10.4	387
19	929	12.7	5,633	9	136	10.5	366
22	682	11.7	3,675	12	125	10.4	300
25	647	11.4	3,032	15	147	10.5	376
28	492	10.7	1,867	18	180	10.6	465
31	364	10.4	1,312	21	149	10.5	339
June 3	651	11.2	2,361	24	143	10.5	337
6	628	11.4	2,980	28	138	10.5	343
9	525	11.0	1,944	31	151	10.5	350

Daily gage height, in feet, of Rio Grande near San Marcial, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.45	10.75	11.15	11.3	13.15	10.4	8.65	9.05	10.5	.....	8.75	10.1
2	11.4	10.7	11.15	11.3	13.25	10.8	8.45	9.5	9.4	.....	8.8	10.2
3	11.3	10.75	11.1	11.2	13.1	11.25	.....	9.5	9.0	.....	8.75	10.3
4	11.45	10.8	11.1	11.15	13.05	11.5	.....	9.4	9.4	.....	8.85	10.35
5	11.65	10.75	11.15	11.25	12.95	11.5	.....	9.55	9.1	.....	8.85	10.45
6	11.6	10.75	11.1	11.25	12.85	11.4	.....	9.4	8.85	.....	8.95	10.4
7	11.55	10.8	11.25	11.3	12.65	11.4	.....	9.25	8.65	.....	9.0	10.45
8	11.5	10.85	11.4	11.25	12.5	11.25	.....	9.1	.....	.....	9.25	10.5
9	10.75	10.7	11.35	11.35	12.5	11.0	.....	9.0	.....	.....	9.4	10.5
10	10.5	10.8	11.35	11.5	12.2	10.95	.....	8.8	.....	.....	9.4	10.65
11	10.55	10.7	11.3	11.6	12.1	10.75	.....	10.2	.....	.....	9.4	10.55
12	10.55	10.6	11.35	11.5	12.2	10.45	.....	10.8	.....	.....	9.4	10.4
13	10.65	10.6	11.4	11.5	12.2	10.25	.....	9.55	.....	.....	9.4	10.45
14	10.75	10.7	11.5	11.6	12.25	10.15	8.85	9.25	.....	.....	9.5	10.5
15	10.85	10.7	11.4	11.9	12.35	10.0	9.2	9.2	.....	.....	9.55	10.55
16	11.05	10.7	11.35	11.85	12.55	9.85	9.2	9.0	.....	.....	9.6	10.6
17	11.05	10.75	11.4	11.9	12.6	9.8	8.65	8.55	.....	.....	9.6	10.6
18	10.95	10.8	11.4	11.85	12.6	9.7	8.4	8.55	.....	.....	9.7	10.6
19	10.9	10.85	11.3	11.65	12.7	9.7	.....	8.45	.....	.....	9.85	10.6
20	10.85	10.95	11.3	11.7	12.55	9.65	.....	8.4	8.6	.....	9.7	10.55
21	10.9	10.9	11.3	11.7	12.4	9.45	.....	.....	8.4	.....	9.7	10.5
22	10.9	10.8	11.45	11.7	11.85	9.3	.....	.....	.....	8.7	9.75	10.5
23	10.9	10.85	11.6	12.15	11.55	9.2	.....	.....	8.45	8.8	9.8	10.5
24	10.85	10.9	11.7	12.3	11.45	9.1	.....	9.15	9.0	8.7	9.8	10.5
25	10.75	10.9	11.8	12.45	11.4	8.95	.....	8.75	9.1	8.7	9.9	10.55
26	10.7	10.8	11.8	12.5	11.1	8.75	.....	.....	8.7	8.8	9.95	10.6
27	10.75	11.1	11.8	12.5	10.85	8.7	.....	.....	8.55	8.85	10.0	10.55
28	10.8	11.15	11.7	12.7	10.7	8.85	.....	9.15	8.4	8.75	10.0	10.5
29	10.8	.....	11.6	12.75	10.55	8.9	8.9	8.65	.....	8.7	10.0	10.55
30	10.7	.....	11.6	12.95	10.45	8.9	8.6	8.65	.....	8.7	10.1	10.45
31	10.7	.....	11.45	.....	10.4	.....	8.5	9.5	.....	8.7	.....	10.45

NOTE.—There was no flow on days for which there are no gage heights.

Daily discharge, in second-feet, of Rio Grande near San Marcial, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a1,730	835	1,400	2,310	8,130	1,310	20	85	a 785	0	40	310
2	1,530	775	1,470	2,310	8,420	1,840	5	150	260	0	55	325
3	1,230	a 835	a1,500	a2,050	7,990	a2,460	0	a 150	65	0	a 40	a 340
4	a1,430	870	1,600	1,900	a7,850	3,030	0	125	a 125	0	55	365
5	1,380	800	1,750	2,200	7,450	3,100	0	165	80	0	55	410
6	825	a 780	a1,800	a2,200	7,100	a2,980	0	a 125	45	0	a 60	a 385
7	a 275	815	1,940	2,230	a6,380	2,900	0	85	10	0	60	390
8	340	850	2,080	1,980	6,080	2,520	0	60	0	0	85	395
9	405	a 680	a2,040	a2,110	6,080	a1,940	0	a 45	0	0	a 100	a 365
10	a 470	815	2,140	2,360	a5,370	1,840	0	25	0	0	110	470
11	595	745	2,200	2,490	4,950	1,440	0	a 680	0	0	115	405
12	715	a 680	a2,360	a2,120	5,140	a 940	0	1,220	0	0	a 125	a 300
13	a 940	620	2,470	2,120	a5,030	915	0	295	0	0	125	340
14	1,020	645	2,630	2,440	5,280	900	a 95	a 75	0	0	150	375
15	1,070	585	a2,470	3,380	5,640	a 880	160	30	0	0	a 160	a 415
16	a1,210	a 525	2,350	a3,220	a6,390	605	160	25	0	0	155	450
17	1,310	555	2,330	3,380	6,190	515	a 40	a 10	0	0	140	460
18	1,310	580	a2,260	3,160	5,810	a 335	5	10	0	0	a 140	a 465
19	a1,370	a 610	2,200	2,310	a5,630	335	0	5	0	0	185	450
20	1,260	725	2,230	a2,520	5,340	300	0	a 5	a 10	0	180	395
21	1,260	715	a2,260	2,520	5,040	a 175	0	0	5	0	a 180	a 340
22	a1,200	a 655	2,390	2,520	a3,970	130	0	0	0	a 15	190	340
23	1,160	700	2,530	a3,590	3,350	100	0	0	5	25	195	335
24	1,070	750	a2,620	3,720	3,140	a 70	0	a 55	a 45	20	a 195	a 335
25	a 930	a 750	2,900	4,410	a3,030	55	0	15	55	a 20	230	370
26	840	650	3,100	a4,640	2,530	40	0	0	a 10	35	250	405
27	835	1,270	a3,300	4,870	2,120	a 35	0	0	5	45	a 270	375
28	a 830	a1,370	3,200	6,300	a1,870	40	0	a 60	a 5	a 40	270	a 345
29	830	.....	3,100	a6,830	1,590	40	a 35	15	0	30	270	380
30	775	.....	a3,100	7,560	1,400	a 40	10	15	0	30	a 310	320
31	a 775	.....	2,710	.....	1,310	.....	a 5	a 170	.....	a 30	.....	a 320

a Date of measurement.

Monthly discharge of Rio Grande near San Marcial, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	1,730	275	997	61,329
February	1,370	525	757	42,019
March	3,300	1,400	2,336	143,663
April	7,560	1,900	3,192	189,917
May	8,420	1,310	5,019	308,628
June	3,100	35	1,060	63,094
July	160	0	17	1,061
August	1,220	0	119	7,339
September	785	0	50	2,995
October	45	0	9	575
November	310	40	150	8,915
December	465	310	377	23,157
The year	8,420	0	1,180	852,692

RIO GRANDE NEAR EL PASO, TEX.

This station was located at the pumping house of the smelter company, 3 miles north of El Paso, Tex. The bed of the stream at that point is composed of mud and is constantly shifting. On May 1, 1897, the station was placed under the charge of W. W. Follett, consulting engineer, International Water Commission (prior to July 1, 1910, International Boundary Commission), and by him removed 1 mile farther up the river to Courchesne's limekiln. Although the section is unstable and subject to overflow, it is still the best site for a station in the vicinity of El Paso, as the entire bed is constantly shifting for many miles above and below. On this account frequent discharge measurements are made in order to closely estimate the daily discharge.

River heights were measured at the masonry pump-foundation pier. As the pier was torn down in October, 1902, an inclined wooden gage was established some 60 feet upstream. This has since been moved about 300 feet downstream.

Discharge measurements of Rio Grande near El Paso, Tex., 1910.

[By W. L. Follett.]

Date.	Area of section.	Gage height	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	141	7.45	236	Apr. 9	312	10.0	1,310
9	206	8.5	669	12	325	10.2	1,383
12	171	8.05	469	15	340	10.35	1,640
15	174	8.2	496	18	451	10.9	2,114
18	230	8.7	776	22	355	10.4	1,733
21	247	8.8	919	25	426	10.8	2,204
24	262	8.95	1,038	28	670	11.6	3,366
28	200	8.5	667	30	937	12.2	4,866
31	199	8.4	567	May 3	1,160	12.9	6,967
Feb. 4	211	8.4	485	6	1,185	12.9	7,573
7	254	8.6	506	9	943	11.8	5,531
10	315	9.1	498	12	732	11.9	4,227
13	205	8.4	277	15	764	11.0	4,270
17	186	8.45	275	18	884	11.9	5,223
20	149	8.2	179	22	784	11.5	5,320
23	310	9.2	500	25	449	9.9	2,537
26	109	7.9	133	28	327	9.4	1,594
Mar. 2	182	8.5	241	31	251	8.85	1,012
6	371	9.7	747	June 4	144	8.1	460
9	432	10.5	1,728	8	349	9.8	1,597
12	416	10.5	1,640	12	225	9.1	946
15	357	10.4	1,619	16	139	8.0	338
18	350	10.3	1,519	19	33	6.8	38
21	422	10.5	1,711	22	30	6.8	41
24	362	10.4	1,619	25	11	6.2	6
27	374	10.55	1,808	28	30	6.8	36
31	464	10.9	2,320	30	43	7.1	50
Apr. 3	424	10.4	1,876	Dec. 8	16	6.6	22
6	338	10.15	1,356	27	21	6.7	24

Daily gage height, in feet, of Rio Grande near El Paso, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.	Dec.
1	7.0	8.4	8.9	10.85	12.2	8.5	6.65	.....	.....
2	7.1	8.5	8.7	10.65	12.4	8.45	6.35	.....	.....
3	7.3	8.5	8.95	10.4	12.7	8.0	.....	6.9	.....
4	7.65	8.45	9.65	10.2	12.8	8.05	.....	6.1	.....
5	8.75	8.5	9.2	9.9	13.0	9.1	.....	6.0	.....
6	9.35	8.6	9.6	10.0	12.95	9.45	.....	.....	6.4
7	9.45	8.6	10.75	10.0	12.75	9.75	.....	.....	6.55
8	9.3	8.8	10.6	9.9	12.35	9.8	.....	.....	6.65
9	8.65	9.0	10.5	9.9	11.9	9.7	.....	.....	6.5
10	8.15	9.1	10.3	10.1	11.45	9.5	.....	.....	6.3
11	7.95	8.55	10.3	10.15	11.3	9.2	.....	.....	6.45
12	8.0	8.5	10.35	10.15	11.6	9.1	.....	.....	6.35
13	7.9	8.3	10.65	10.35	11.8	8.9	.....	.....	6.45
14	7.75	8.75	10.5	10.4	11.6	8.45	.....	.....	6.4
15	7.9	8.75	10.4	10.2	11.1	8.2	.....	.....	6.3
16	8.6	8.9	10.35	10.3	11.3	7.9	.....	.....	6.3
17	8.9	8.4	10.25	10.55	11.55	7.55	.....	.....	6.3
18	8.6	8.3	10.25	10.9	11.75	7.2	.....	.....	.....
19	8.55	8.3	10.5	10.9	11.75	6.95	.....	.....	.....
20	8.55	8.25	10.45	10.95	11.5	6.95	.....	.....	6.3
21	8.75	8.05	10.5	10.6	11.5	7.35	.....	.....	6.5
22	8.9	7.95	10.4	10.45	11.5	6.9	.....	.....	6.5
23	9.0	8.7	10.2	10.2	10.45	6.25	.....	.....	6.6
24	8.85	8.9	10.35	10.4	10.3	6.2	.....	.....	6.6
25	8.8	8.4	10.5	10.65	9.95	6.3	.....	.....	6.7
26	8.75	7.95	10.5	11.15	9.75	6.25	.....	.....	6.7
27	8.6	7.75	10.55	11.4	9.65	6.45	.....	.....	6.7
28	8.5	8.3	10.75	11.5	9.4	7.5	.....	.....	6.6
29	8.55	.....	10.9	11.7	9.15	8.5	.....	.....	6.3
30	8.5	.....	10.9	12.1	8.75	7.3	.....	.....	.....
31	8.4	.....	10.9	.....	8.75	.....	.....	.....	.....

NOTE.—There was no flow on days for which no gage heights are given.

Daily discharge, in second-feet, of Rio Grande near El Paso, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	115	545	400	2,270	4,870	755	25	0	0	0	0	0
2	140	555	a320	2,090	5,470	715	10	0	0	0	0	0
3	a195	535	430	a1,880	a6,370	385	0	0	50	0	0	0
4	340	a500	725	1,610	6,870	a420	0	0	10	0	0	0
5	925	495	535	1,260	7,670	1,130	0	0	5	0	0	0
6	1,350	505	a705	a1,240	a7,720	1,360	0	0	0	0	0	5
7	1,430	a505	2,030	1,310	7,290	1,570	0	0	0	0	0	15
8	1,310	515	1,850	1,280	6,550	a1,600	0	0	0	0	0	a25
9	a790	520	a1,730	a1,280	a5,710	1,500	0	0	0	0	0	15
10	530	a495	1,500	1,350	4,630	1,320	0	0	0	0	0	5
11	450	325	1,470	1,360	3,980	1,040	0	0	0	0	0	15
12	a470	310	a1,490	a1,360	a3,870	a945	0	0	0	0	0	5
13	410	a250	1,790	1,640	4,480	835	0	0	0	0	0	15
14	335	410	1,690	1,720	4,610	590	0	0	0	0	0	10
15	a375	405	a1,620	a1,380	a4,390	450	0	0	0	0	0	5
16	720	460	1,570	1,600	4,590	a315	0	0	0	0	0	5
17	890	a255	1,470	1,810	4,850	225	0	0	0	0	0	5
18	a720	220	a1,470	a2,110	a5,070	140	0	0	0	0	0	0
19	675	220	1,710	2,110	5,170	a75	0	0	0	0	0	0
20	695	a200	1,660	2,150	4,950	85	0	0	0	0	0	5
21	a880	130	a1,710	1,890	5,140	205	0	0	0	0	0	15
22	1,000	100	1,620	a1,770	a5,320	a70	0	0	0	0	0	15
23	1,080	a340	1,430	1,500	3,490	10	0	0	0	0	0	20
24	a955	415	a1,570	1,730	3,230	5	0	0	0	0	0	20
25	915	275	1,740	a2,030	a2,620	a10	0	0	0	0	0	25
26	875	a150	1,740	2,710	2,250	10	0	0	0	0	0	25
27	750	105	a1,810	3,080	2,060	20	0	0	0	0	0	a25
28	a665	205	2,100	a3,220	a1,590	a245	0	0	0	0	0	20
29	715	.....	2,320	3,620	1,330	545	0	0	0	0	0	5
30	665	.....	2,320	a4,620	905	a125	0	0	0	0	0	0
31	a565	.....	2,320	.....	a905	.....	0	0	.....	0	.....	0

a Date of measurement.

Monthly discharge of Rio Grande near El Paso, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	1,430	115	707	43,498
February	555	100	355	19,726
March	2,320	320	1,511	92,916
April	4,620	1,240	1,966	116,985
May	7,720	905	4,450	273,620
June	1,600	5	557	33,124
July	25	0	1	69
August	0	0	0	0
September	50	0	2	129
October	0	0	0	0
November	0	0	0	0
December	25	0	10	595
The year	7,720	0	802	580,662

RIO GRANDE ABOVE PRESIDIO, TEX.

This station was established April 4, 1900, by the International Boundary Commission. It was originally located 9 miles above Presidio and 8 miles above the mouth of Rio Conchos, one of the principal tributaries of the Rio Grande, and about 200 miles below El Paso. The station was in a straight stretch of the river, but in the

bight of a long bend. In 1905 the river began to erode a cut-off across this bend, and the spring flood of 1905 deepened this channel to such an extent that more water passed through it than passed the station, and it became necessary to abandon the location. In September, 1905, the station was moved 8 miles farther upstream and rebuilt. Its location was far enough above the mouth of Rio Conchos to be free from the effects of backwater from that stream. Caving banks necessitated the abandonment of this upper site, and the station was moved back to the original site, at the Haciendita, July 6, 1909. A new gage was established whose readings are not comparable with the old ones. Changes of river bed have closed the crevasse which threatened in 1905, and frequent discharge measurements are necessary to determine closely the daily discharge.

The observations at this station have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Rio Grande above Presidio, Tex., in 1910.

[By W. T. Millington.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec-ft.*
Jan. 3	95	6.7	85	Apr. 14	302	7.8	683
6	71	6.4	55	17	287	7.8	604
9	61	6.25	38	20	332	8.1	888
12	319	8.1	730	23	479	9.1	1,900
15	238	7.6	345	26	339	8.5	1,180
18	192	7.3	222	29	395	8.9	1,432
21	215	7.4	328	May 3	667	10.2	3,063
24	234	7.5	373	6	916	11.9	4,835
27	284	8.0	721	9	798	10.95	3,494
30	237	7.7	467	12	821	11.4	3,519
Feb. 3	218	7.4	343	15	1,165	12.4	6,663
6	193	7.4	290	18	838	10.4	3,839
9	199	7.4	315	21	868	10.7	4,199
12	177	7.2	221	24	944	11.2	4,693
15	177	7.1	222	27	846	10.25	2,407
18	183	7.1	227	30	445	8.5	1,460
21	164	6.8	139	June 2	322	7.4	722
24	131	6.65	104	5	248	6.8	288
27	104	6.4	64	8	200	6.3	208
Mar. 3	87	6.1	44	11	134	5.7	111
6	64	6.05	23	14	248	7.0	328
9	51	5.8	19	17	339	7.55	883
12	212	7.8	628	23	132	5.8	118
15	250	8.05	792	26	96	5.35	49
18	340	8.5	1,190	30	130	6.1	134
21	302	8.2	768	July 3	137	5.7	50
24	313	8.3	790	6	34	5.15	6
27	285	8.0	587	9	21	4.85	4
30	298	8.3	758	12	251	6.7	284
Apr. 2	459	9.15	1,483	15	126	5.85	58
5	454	9.0	1,362	18	76	5.4	24
8	322	8.2	640	21	50	4.95	12
11	306	8.0	792	Sept. 8	162	6.0	232

Daily gage height, in feet, of Rio Grande above Presidio, Tex., for 1910.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.
1	6.7	7.5	6.35	8.75	9.9	7.65	6.1	.....
2	6.7	7.45	6.3	9.1	10.05	7.4	5.9	.....
3	6.7	7.35	6.1	9.05	10.25	7.1	5.65	.....
4	6.6	7.55	6.0	9.1	10.4	6.85	5.4	.....
5	6.45	7.55	6.05	9.05	10.65	6.75	5.25	.....
6	6.4	7.45	6.05	8.65	11.45	6.5	5.1	.....
7	6.4	7.35	6.0	8.4	10.75	6.35	5.05	4.8
8	6.35	7.5	5.9	8.2	10.85	6.25	4.9	5.2
9	6.2	7.4	5.8	8.0	10.9	6.05	4.85	.....
10	6.2	7.3	5.8	8.45	10.9	5.85	4.7	.....
11	7.25	7.35	5.7	7.95	11.1	5.65	5.95	.....
12	7.95	7.2	7.85	7.8	11.35	7.1	6.45	.....
13	7.85	7.2	7.9	7.7	11.4	7.05	6.2	.....
14	7.65	7.15	7.95	7.8	12.05	6.95	6.0	.....
15	7.55	7.1	8.1	7.85	12.35	6.75	5.85	.....
16	7.4	7.05	8.5	7.8	11.15	6.8	5.7	.....
17	7.3	7.1	8.65	7.9	10.45	7.55	5.4	.....
18	7.25	7.1	8.45	8.05	10.55	7.3	5.35	.....
19	7.25	6.95	8.4	8.05	10.7	6.5	5.25	.....
20	7.25	6.9	8.3	8.3	10.65	6.35	5.1	.....
21	7.5	6.75	8.2	8.7	10.8	6.2	4.95	.....
22	7.5	6.65	8.25	8.85	11.05	5.95	4.7	.....
23	7.45	6.6	8.35	9.05	11.1	5.85	.....	.....
24	7.5	6.65	8.3	9.05	11.3	5.6	.....	.....
25	7.55	6.55	8.25	8.75	11.4	5.5	.....	.....
26	7.95	6.5	8.05	8.5	11.1	6.65	.....	.....
27	7.95	6.4	8.1	8.55	10.0	8.0	.....	.....
28	7.85	6.3	8.35	8.5	9.2	6.3	.....	.....
29	7.8	.....	8.35	9.1	8.7	6.55	.....	.....
30	7.7	.....	8.3	9.5	8.45	6.05	.....	.....
31	7.6	.....	8.2	.....	8.25	.....	.....	.....

NOTE.—There was no flow on days for which no gage heights are given.

Daily discharge, in second-feet, of Rio Grande above Presidio, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	85	385	55	1,160	2,620	900	135	0	0	0	0	0
2	85	365	50	a1,440	2,840	a720	90	0	0	0	0	0
3	a85	a325	a45	1,360	a3,110	505	a45	0	0	0	0	0
4	75	385	35	1,420	3,270	325	25	0	0	0	0	0
5	60	365	30	a1,340	3,530	a280	15	0	0	0	0	0
6	a55	a310	a25	1,010	a4,200	240	a5	0	0	0	0	0
7	55	280	25	805	3,210	215	5	0	30	0	0	0
8	50	345	20	a640	3,350	a200	5	0	a95	0	0	0
9	a35	a315	a20	625	a3,420	170	a5	0	0	0	0	0
10	35	270	20	935	3,220	135	5	0	0	0	0	0
11	425	290	15	a765	3,300	a100	170	0	0	0	0	0
12	a680	a220	a660	685	a3,360	345	a220	0	0	0	0	0
13	540	230	695	630	3,520	335	155	0	0	0	0	0
14	385	225	725	a685	5,560	a320	100	0	0	0	0	0
15	a325	a220	a835	680	a6,590	280	60	0	0	0	0	0
16	265	210	1,190	630	4,910	320	45	0	0	0	0	0
17	220	225	1,320	a700	3,910	a885	25	0	0	0	0	0
18	a200	a225	a1,120	840	4,020	775	a20	0	0	0	0	0
19	225	185	1,050	840	4,200	425	20	0	0	0	0	0
20	245	170	910	a1,090	4,140	355	15	0	0	0	0	0
21	a375	a130	a770	1,490	a4,300	290	a10	0	0	0	0	0
22	375	105	780	1,650	4,550	185	5	0	0	0	0	0
23	350	95	800	a1,850	4,600	a140	0	0	0	0	0	0
24	a375	105	a790	1,840	a4,810	90	0	0	0	0	0	0
25	410	90	755	1,480	4,930	75	0	0	0	0	0	0
26	690	80	620	a1,180	4,270	a570	0	0	0	0	0	0
27	a680	65	a645	1,210	a2,270	1,110	0	0	0	0	0	0
28	595	50	785	1,180	1,840	245	0	0	0	0	0	0
29	550	.....	785	a1,630	1,570	370	0	0	0	0	0	0
30	a465	.....	760	2,030	a1,440	a125	0	0	0	0	0	0
31	430	.....	710	.....	1,340	.....	0	0	.....	0	.....	0

a Date of measurement.

Monthly discharge of Rio Grande above Presidio, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	690	35	304	18,694
February	385	50	224	12,426
March	1,320	15	550	33,808
April	2,030	625	1,127	67,081
May	6,590	1,340	3,619	222,545
June	1,110	75	368	21,878
July	220	0	38	2,341
August	0	0	0	0
September	95	0	4	248
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
The year	6,590	0	524	379,021

RIO GRANDE BELOW PRESIDIO, TEX.

The station was established April 8, 1900, by the International Boundary Commission. It is 6 miles below Presidio, 7 miles below the mouth of the Rio Conchos, and about 215 miles below El Paso. It is at the west end of the canyon section of the Rio Grande. The discharge at this station minus the discharge at the station above Presidio, Tex., is the discharge of Rio Conchos, except at rare intervals, when some rain water enters the Rio Grande from the north.

The river is fairly straight at the station and for one-fourth mile above and below. The right bank is a rocky bluff. The left bank is an alluvial deposit and overflows for 750 feet back from the river where gravel hills are found. The bed is of shifting sand and is affected by a drainage line called Alamos Creek, which reaches the river one-fourth mile below the station. This creek is subject to torrential floods, which bring large quantities of bowlders and gravel into the Rio Grande, forming a temporary dam, which remains, throwing backwater on to the gage, until a flood in the river scours it out. The extreme floods come from the Rio Conchos, the highest recorded gage height being 26.35 feet on September 11, 1904. Frequent discharge measurements are made to determine closely the daily flow

The observations at this station have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Rio Grande below Presidio, Tex., in 1910.

[By W. T. Millington.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 4	961	8.3	2,055	July 7	1,193	9.3	3,023
7	871	8.1	1,140	10	1,043	8.4	2,349
10	786	7.9	808	13	1,019	8.1	1,904
13	1,021	8.3	2,429	16	877	8.0	1,370
16	754	7.9	1,552	19	849	7.8	1,184
19	739	7.7	1,166	22	717	7.2	825
22	742	7.7	1,375	25	439	6.9	248
25	722	7.7	1,040	28	451	7.0	290
28	749	7.8	1,352	31	447	7.0	248
31	713	7.6	1,106	Aug. 4	359	6.7	162
Feb. 4	701	7.4	1,087	7	365	6.9	192
7	704	7.3	1,192	10	408	7.0	292
10	681	7.2	1,000	13	366	6.7	187
13	676	7.1	977	16	696	8.1	1,556
16	644	7.0	826	19	810	8.3	1,989
19	624	7.0	674	22	1,007	8.6	2,806
22	606	7.0	549	25	1,304	9.2	4,576
25	581	6.9	516	28	923	8.3	1,848
28	549	6.8	449	31	789	7.8	1,226
Mar. 4	483	6.6	315	Sept. 3	545	7.6	572
7	439	6.6	262	6	555	7.6	684
10	421	6.5	184	9	1,245	9.9	3,699
13	545	7.4	729	12	1,221	9.7	3,135
16	597	7.7	766	15	955	8.7	1,688
19	782	8.3	1,671	18	798	8.1	1,261
22	710	7.9	1,147	21	1,702	11.1	5,210
25	685	8.0	1,077	24	1,194	9.2	2,960
28	686	7.9	1,323	27	811	8.4	1,544
31	689	8.0	1,513	30	706	8.0	1,158
Apr. 3	768	8.3	1,993	Oct. 4	620	7.8	863
6	720	8.1	1,539	7	541	7.4	649
9	628	7.9	1,202	10	526	7.3	560
12	589	7.6	973	13	494	7.1	493
15	577	7.7	946	16	470	7.1	448
18	595	7.8	949	20	439	6.9	365
21	618	8.0	1,613	22	460	7.0	407
24	658	8.3	2,215	25	457	6.9	370
27	618	8.0	1,524	28	423	6.8	296
30	686	8.3	1,893	31	465	7.0	380
May 4	946	8.9	3,085	Nov. 3	464	7.0	324
7	1,082	9.1	3,530	6	317	7.0	325
10	1,157	9.1	3,485	9	207	7.0	317
13	1,240	9.4	4,312	12	194	6.9	283
16	1,380	9.5	5,069	15	188	6.9	264
19	1,164	9.1	4,051	18	192	6.9	259
22	1,185	9.2	4,249	21	189	6.8	209
25	1,239	9.35	4,946	24	168	6.7	168
28	1,097	8.8	2,329	27	158	6.6	129
31	622	8.2	1,367	30	158	6.6	130
June 3	510	7.7	1,023	Dec. 4	158	6.5	126
6	401	7.2	325	7	152	6.5	108
9	323	6.8	243	10	135	6.5	93
12	386	7.3	389	13	145	6.5	83
15	388	7.3	337	16	154	6.4	80
17	554	7.9	1,272	19	136	6.4	71
24	252	6.2	191	22	128	6.4	73
27	882	8.6	2,540	25	119	6.4	57
29	1,789	11.4	6,999	28	106	6.3	51
July 4	1,262	9.5	3,980	31	103	6.3	53

Daily gage height, in feet, of Rio Grande below Presidio, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.65	7.45	6.75	8.15	8.65	7.95	10.55	6.9	7.8	8.0	7.0	6.6
2	8.5	7.4	6.7	8.3	8.65	7.8	10.15	6.8	7.65	7.8	7.0	6.5
3	8.4	7.4	6.7	8.3	8.8	7.65	10.55	6.7	7.6	7.8	7.0	6.5
4	8.25	7.4	6.6	8.3	8.9	7.4	10.15	6.7	7.6	7.75	7.0	6.5
5	8.15	7.3	6.6	8.25	9.1	7.3	10.1	6.65	7.45	7.65	7.0	6.5
6	8.1	7.3	6.6	8.1	9.4	7.2	9.6	6.75	7.65	7.5	7.0	6.5
7	8.05	7.3	6.55	8.0	9.05	7.05	9.25	6.95	7.95	7.4	7.0	6.5
8	8.0	7.3	6.5	8.0	9.1	6.95	8.9	7.35	10.6	7.35	7.0	6.5
9	7.95	7.25	6.5	7.9	9.1	6.75	8.55	7.2	9.85	7.35	7.0	6.5
10	7.9	7.2	6.45	7.8	9.1	6.6	8.35	7.0	9.65	7.3	7.0	6.5
11	7.95	7.1	6.4	7.8	9.15	6.5	8.6	6.85	10.1	7.2	6.9	6.5
12	8.35	7.1	6.85	7.6	9.35	7.3	9.1	6.6	9.6	7.15	6.9	6.5
13	8.25	7.1	7.45	7.65	9.45	7.4	8.1	6.65	9.2	7.1	6.9	6.5
14	8.2	7.1	7.5	7.7	9.5	7.4	8.05	6.65	8.95	7.3	6.9	6.45
15	8.1	7.1	7.65	7.75	9.65	7.25	7.9	6.95	8.75	7.2	6.9	6.4
16	7.95	7.0	7.75	7.7	9.4	7.1	7.95	8.15	8.45	7.1	6.9	6.4
17	7.9	7.0	8.0	7.7	9.15	7.8	7.8	8.05	8.2	7.1	6.9	6.4
18	7.8	7.0	8.1	7.8	9.1	7.75	7.8	7.95	8.1	7.05	6.9	6.4
19	7.7	7.0	8.2	7.7	9.1	7.05	7.7	8.3	8.15	7.0	6.8	6.4
20	7.6	7.0	8.1	7.7	9.15	6.75	7.5	8.45	9.8	6.9	6.8	6.4
21	7.6	7.0	7.95	8.05	9.1	6.6	7.35	8.2	11.1	6.9	6.8	6.4
22	7.7	6.95	7.9	8.2	9.2	6.4	7.2	8.65	10.0	7.0	6.7	6.4
23	7.7	6.9	8.0	8.3	9.2	6.3	7.1	8.95	9.4	6.9	6.7	6.4
24	7.7	6.9	8.0	8.25	9.3	6.2	7.0	9.7	9.1	6.8	6.7	6.4
25	7.7	6.9	8.0	8.1	9.35	7.9	6.95	9.1	8.85	6.85	6.7	6.4
26	7.75	6.9	8.0	8.0	9.15	8.4	7.15	8.75	8.55	6.8	6.7	6.3
27	7.9	6.8	7.8	8.0	8.95	8.95	7.05	8.45	8.35	6.8	6.6	6.3
28	7.8	6.8	7.95	8.0	8.75	8.35	7.0	8.3	8.2	6.8	6.6	6.3
29	7.75	.....	8.0	8.2	8.5	11.35	6.9	8.15	8.1	6.8	6.6	6.3
30	7.65	.....	7.9	8.35	8.35	11.2	7.05	7.95	8.0	6.9	6.6	6.3
31	7.55	.....	8.0	.....	8.15	.....	7.0	7.8	.....	7.0	.....	6.3

Daily discharge, in second-feet, of Rio Grande below Presidio, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,630	1,100	415	1,750	2,590	1,190	5,650	220	1,120	1,140	360	130
2	2,380	1,090	385	1,990	2,590	1,090	5,010	190	765	890	340	125
3	2,220	1,090	385	a1,990	2,890	a955	5,650	160	a570	875	a325	125
4	a1,970	a1,090	a315	1,990	a3,090	605	a5,010	a160	610	a835	325	a125
5	1,610	1,050	295	1,880	3,530	465	4,940	155	465	780	325	120
6	1,330	1,120	280	a1,540	4,200	a325	3,740	170	a750	700	a325	115
7	a1,060	a1,190	a225	1,370	a3,430	295	a2,980	a240	1,140	a650	320	a110
8	970	1,160	185	1,370	3,510	275	2,720	640	4,610	605	320	105
9	890	1,080	185	a1,200	3,500	a230	2,460	490	a3,620	605	a315	100
10	a810	a1,000	a155	1,130	a3,490	185	a2,270	a290	3,320	a560	315	a95
11	1,210	975	125	1,130	3,620	155	2,640	240	4,040	525	285	90
12	2,180	975	400	a975	4,180	a390	3,390	150	a2,990	510	a285	85
13	a2,320	a975	a735	975	a4,460	400	a1,900	a165	2,410	a490	275	a85
14	2,210	960	740	980	4,760	385	1,700	165	2,050	575	270	80
15	1,990	945	760	a985	5,370	a320	1,330	455	a1,760	510	a265	80
16	a1,660	a825	a765	920	a4,810	275	a1,320	a1,610	1,510	a450	260	a80
17	1,550	775	1,220	895	4,180	a1,150	1,180	1,510	1,330	450	260	75
18	1,360	775	1,370	a950	4,050	1,150	1,180	1,410	a1,260	430	a260	75
19	a1,170	a675	a1,520	905	a4,050	590	a1,120	a1,990	1,300	405	220	a70
20	1,080	630	1,410	1,020	4,150	350	1,000	2,360	3,480	a365	215	70
21	1,150	590	1,210	a1,710	4,050	305	915	1,930	a5,210	365	a210	75
22	a1,380	a535	a1,150	2,010	a4,250	245	a825	a2,910	3,910	a405	175	a75
23	1,260	515	1,190	2,210	4,360	215	635	3,510	3,200	370	175	70
24	1,150	a515	1,130	a2,130	4,710	a190	440	5,010	a2,780	335	a170	65
25	a1,040	515	a1,080	1,820	a4,950	1,860	a270	a4,330	2,340	a350	165	a55
26	1,170	450	1,190	1,590	3,990	2,350	355	3,290	1,810	320	160	50
27	1,460	a450	1,110	a1,520	3,040	a3,100	310	2,380	a1,500	310	a130	50
28	a1,350	.....	a1,390	1,520	a2,330	2,140	a290	a1,850	1,350	a295	130	a50
29	1,290	.....	1,480	1,770	1,850	6,910	230	1,660	1,250	295	130	50
30	1,170	.....	1,360	a1,960	1,610	6,670	245	1,410	a1,160	340	a130	55
31	a1,050	.....	a1,510	.....	a1,290	.....	a250	a1,230	.....	a380	.....	a55

a Date of measurement.

Monthly discharge of Rio Grande below Presidio, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	2,630	810	1,486	91,379
February	1,190	450	840	46,641
March	1,520	125	828	50,916
April	2,210	895	1,473	87,640
May	5,370	1,290	3,641	223,894
June	6,910	155	1,159	68,955
July	5,650	230	1,999	122,886
August	5,010	150	1,364	83,861
September	5,210	465	2,120	126,169
October	1,140	295	520	31,964
November	360	130	248	14,757
December	130	50	84	5,137
The year	6,910	50	1,320	954,189

RIO GRANDE NEAR LANGTRY, TEX.

This station was established in April, 1900, by the International Boundary Commission. It is located one-half mile south of Langtry station, on the Southern Pacific Railroad, and is about 440 miles below El Paso, Tex., at the east end of the canyon section of the Rio Grande, and a short distance to the west of the mouth of Pecos River, one of the principal tributaries of the Rio Grande.

The right (Mexican) bank is a rock bluff; the left bank is alluvial deposit for 200 feet back to a rock bluff. As the river is constantly shifting, because of alluvial deposits, frequent discharge measurements are made in order to determine closely the daily flow.

Observations at this station have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Rio Grande near Langtry, Tex., in 1910.

[By E. E. Winter and W. H. Dodd.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft*
Jan. 1	1,148	3.2	5,569	Apr. 2	603	1.2	1,472
6	686	1.9	2,097	7	644	1.6	1,757
10	659	1.7	1,844	11	619	1.3	1,527
14	632	1.5	1,686	15	544	1.0	1,228
19	634	1.5	1,702	20	536	.9	1,186
24	577	1.05	1,373	23	535	.9	1,203
28	578	1.0	1,354	27	680	1.5	1,829
Feb. 2	582	1.1	1,302	May 3	665	1.45	1,728
7	545	.9	1,178	7	1,012	2.75	4,194
11	537	.8	1,138	12	1,001	2.6	3,973
15	503	.7	1,019	16	1,065	3.1	4,943
19	466	.6	926	20	1,131	3.25	5,212
25	441	.5	833	24	995	2.65	4,040
Mar. 2	431	.4	813	30	934	2.5	3,631
7	419	.3	768	June 1	776	2.0	2,438
11	394	.2	682	6	611	1.3	1,533
15	388	.2	658	10	499	.75	1,029
19	509	.7	1,060	15	426	.4	769
24	646	1.35	1,537	20	453	.6	922
28	624	1.25	1,486	28	1,486	4.5	8,993

Discharge measurements of Rio Grande near Langtry, Tex., in 1910—Continued.

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec. ft.*		*Sq. ft.*	*Feet.*	*Sec. ft.*
July 2	1,174	3.2	5,566	Oct. 6	472	0.7	1,042
7	1,144	3.2	5,430	10	472	.7	1,005
12	663	1.65	1,946	14	430	.5	842
16	624	1.45	1,602	19	410	.3	775
21	518	.75	1,100	23	401	.3	786
28	429	.35	771	28	369	.2	641
Aug. 2	388	.15	656	Nov. 2	365	.15	602
6	383	.1	636	6	365	.15	591
11	337	.05	546	10	357	.15	570
16	334	.05	533	14	355	.15	575
20	349	— .05	512	18	364	.1	580
24	614	1.25	1,534	23	361	.1	573
28	822	2.0	2,638	27	363	.15	596
Sept. 2	568	1.0	1,263	Dec. 2	354	.0	557
7	926	1.95	2,705	7	362	.1	573
11	548	.9	1,194	11	362	.1	581
15	880	2.35	3,231	15	357	.0	569
19	820	2.0	2,694	19	347	.0	563
23	1,096	3.0	4,877	23	350	.0	537
27	824	2.0	2,752	28	340	— .05	519
Oct. 2	589	1.1	1,358				

Daily gage height, in feet, of Rio Grande near Langtry, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	1.15	0.4	1.15	1.35	1.95	2.75	0.15	1.25	1.65	0.15	0.1
2	3.0	1.1	.4	1.2	1.35	1.85	3.1	.15	1.05	1.15	.15	.0
3	2.55	1.1	.4	1.3	1.45	1.75	2.9	.1	1.05	1.05	.15	.0
4	2.15	1.0	.35	1.35	1.65	1.55	3.0	1	.95	.95	.15	.1
5	1.95	1.0	.35	1.45	1.85	1.4	2.65	.1	.8	.9	.2	.1
6	1.9	1.0	.3	1.6	2.05	1.9	2.75	.1	4.1	.75	.15	.1
7	1.85	.9	.3	1.6	2.65	1.45	3.15	.1	1.9	.7	.2	.1
8	1.8	.9	.3	1.7	2.65	1.25	2.55	.05	1.85	.7	.2	.1
9	1.7	.9	.3	1.75	2.75	1.15	2.05	.05	1.6	.7	.15	.1
10	1.7	.85	.2	2.1	2.55	.75	2.0	.05	1.2	.7	.15	.1
11	1.55	.8	.2	1.35	2.5	.7	1.75	.05	1.15	.6	.15	.1
12	1.45	.8	.2	1.3	2.6	.7	1.65	.15	2.6	.6	.15	.1
13	1.4	.8	.2	1.1	2.7	.5	1.7	.05	2.45	.55	.15	.1
14	1.5	.75	.2	1.1	2.8	.45	1.85	.05	2.65	.45	.15	.1
15	1.55	.7	.2	1.0	2.85	.4	2.0	.05	2.35	.45	.2	.0
16	1.65	.7	.15	1.0	3.0	.3	1.5	.05	2.35	.4	.15	.05
17	1.6	.7	.1	.9	3.15	.65	1.35	.0	1.95	.3	.1	.1
18	1.5	.7	.2	.9	3.05	.7	1.15	— .05	1.8	.3	.1	.0
19	1.5	.65	.75	.9	2.95	.6	.95	— .05	1.95	.3	.15	.0
20	1.3	.6	.95	.9	3.15	1.25	.8	— .05	1.7	.3	.1	.0
21	1.2	.55	1.15	.9	2.6	1.5	.75	— .05	1.55	.3	.1	.0
22	1.2	.55	1.25	.9	2.6	.95	.65	— .05	1.35	.3	.1	.0
23	1.2	.5	1.55	.9	2.7	.8	.5	.35	2.4	.3	.1	.0
24	1.05	.5	1.35	.9	2.7	.6	.5	1.1	2.95	.3	.1	.0
25	1.1	.5	1.25	1.2	2.7	.55	.5	.95	2.45	.3	.15	.0
26	1.0	.45	1.35	1.4	2.75	1.1	.45	.85	2.2	.25	.15	.0
27	1.0	.45	1.3	1.5	2.8	2.8	.4	1.1	2.0	.2	.15	— .05
28	1.0	.45	1.25	1.55	2.75	3.85	.35	1.9	1.95	.2	.1	— .05
29	1.0	.....	1.3	1.4	2.6	2.6	.25	1.7	1.65	.15	.1	— .05
30	1.0	.....	1.1	1.35	2.5	2.6	.25	1.45	1.9	.15	.1	— .05
31	1.0	.....	1.1	.....	2.25	.....	.15	1.35	.....	.15	.....	— .05

Daily discharge, in second-feet, of Rio Grande near Langtry, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a5,850	1,380	795	1,440	1,680	a2,370	4,570	635	1,550	2,210	610	585
2	5,030	a1,300	a815	a1,470	1,680	2,240	a5,350	a655	a1,320	a1,440	a600	a555
3	3,830	1,300	815	1,540	a1,730	2,110	4,880	645	1,310	1,320	600	555
4	2,770	1,240	790	1,580	2,110	1,850	5,070	640	1,210	1,240	600	575
5	2,230	1,240	790	1,650	2,490	1,660	4,280	635	1,060	1,200	620	575
6	a2,100	1,240	790	1,760	2,870	a2,090	4,470	a635	7,550	a1,080	a590	575
7	2,030	a1,180	a770	a1,760	a4,000	1,670	a5,320	620	a2,630	1,030	610	a575
8	1,970	1,180	760	1,880	4,050	1,490	3,970	590	2,560	1,020	610	575
9	1,840	1,180	750	1,940	4,190	1,400	2,840	575	2,200	1,010	580	575
10	a1,840	1,160	690	2,360	3,900	a1,030	2,730	560	1,630	a1,010	a570	580
11	1,710	a1,140	a680	a1,580	3,830	990	2,170	a545	a1,590	925	570	a580
12	1,640	1,140	680	1,530	a3,970	990	a1,940	565	3,910	925	570	580
13	1,610	1,140	670	1,330	4,170	845	2,030	540	3,670	880	575	580
14	a1,690	1,080	670	1,330	4,360	805	2,290	535	3,990	a825	a575	580
15	1,730	a1,020	a660	a1,230	4,460	a770	2,550	535	a3,230	825	600	a570
16	1,810	1,020	620	1,230	a4,750	695	a1,690	a530	3,230	810	590	570
17	1,780	1,020	580	1,190	5,030	960	1,530	525	2,620	775	580	580
18	1,700	1,020	660	1,190	4,850	995	1,390	510	2,390	775	a580	565
19	a1,700	a975	a1,100	1,190	4,670	920	1,240	510	a2,620	a775	590	a565
20	1,560	925	1,240	a1,190	a5,020	a1,510	1,130	a510	2,300	780	580	555
21	1,480	880	1,390	1,190	3,950	1,730	a1,100	510	2,110	780	575	550
22	1,480	880	1,470	1,200	3,950	1,210	1,020	510	1,850	785	575	545
23	1,480	835	1,690	a1,200	4,140	1,090	895	750	a3,770	a785	a575	a535
24	a1,370	835	a1,540	1,200	a4,140	930	895	a1,380	4,770	775	575	535
25	1,390	a835	1,490	1,520	4,140	890	895	1,230	3,710	760	590	535
26	1,350	795	1,540	1,620	4,240	1,440	855	1,130	3,180	705	590	525
27	1,350	795	1,510	a1,830	4,340	5,210	810	1,460	a2,750	655	a595	520
28	a1,350	795	a1,490	1,880	4,220	a7,540	a770	a2,490	2,680	a640	585	a520
29	1,350	.....	1,520	1,730	3,870	4,240	690	2,190	2,230	620	585	520
30	1,350	.....	1,400	1,680	a3,630	4,240	690	1,810	2,600	620	585	520
31	1,350	.....	1,400	.....	3,130	.....	610	1,660	.....	620	.....	520

a Date of measurement.

Monthly discharge of Rio Grande near Langtry, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	5,850	1,350	1,991	122,420
February	1,380	795	1,055	58,572
March	1,690	580	1,024	62,965
April	2,360	1,190	1,514	90,089
May	5,030	1,680	3,792	233,177
June	7,540	695	1,864	110,896
July	5,350	610	2,280	140,172
August	2,490	510	859	52,790
September	7,550	1,060	2,741	163,081
October	2,210	620	923	56,727
November	610	570	588	34,969
December	585	520	557	34,264
The year	7,550	510	1,600	1,160,122

RIO GRANDE BELOW DEVILS RIVER, TEX.

The station was established in April, 1900, by the International Boundary Commission. It is alongside the Southern Pacific Railroad track, about a mile below the mouth of Devils River and the station of Devils River, and about 480 miles below El Paso.

The bed of the river is rock for a short distance from the left bank; the right bank is alluvial deposit, overflowing in extreme high water for a distance of some 500 feet back from the river. The left bank is a loose rock fill, along which runs the Southern Pacific Railroad.

Frequent discharge measurements are made to determine closely the daily flow. The observations at this station have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Rio Grande below Devils River, Tex., in 1910.

[By E. E. Winter and W. H. Dodd.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq.ft.	*Feet.*	*Sec.-ft.*		*Sq.ft.*	*Feet.*	*Sec.-ft.*
Jan. 5	1,123	4.3	2,909	July 10	1,180	4.6	3,724
9	1,084	4.3	2,881	15	1,129	4.15	2,532
13	1,096	4.2	2,640	20	913	3.85	2,018
18	1,072	4.1	2,518	26	836	3.6	1,606
22	1,078	4.0	2,411	31	772	3.5	1,363
27	1,074	4.0	2,398	Aug. 5	753	3.45	1,263
31	1,053	3.9	2,219	10	749	3.4	1,266
Feb. 5	1,003	3.8	1,961	15	730	3.4	1,215
10	994	3.8	1,924	19	728	3.4	1,207
14	952	3.7	1,776	23	852	3.7	1,735
17	952	3.7	1,746	27	1,170	4.35	2,990
24	932	3.65	1,639	31	1,175	4.45	3,077
28	921	3.6	1,617	Sept. 5	992	4.0	2,165
Mar. 5	907	3.5	1,432	10	1,700	4.5	3,654
10	873	3.5	1,429	14	1,500	4.5	3,346
14	860	3.45	1,394	18	1,313	4.5	3,328
18	919	3.6	1,644	22	1,233	4.2	2,622
23	1,119	4.1	2,492	26	1,462	5.0	4,766
27	1,105	3.9	2,254	30	1,370	4.4	3,062
31	1,106	4.0	2,327	Oct. 5	1,343	4.5	3,292
Apr. 6	1,099	4.0	2,306	9	1,033	4.0	2,279
10	1,180	4.3	2,918	13	947	3.8	1,889
14	1,106	4.0	2,345	18	925	3.7	1,668
19	1,072	3.85	2,154	22	903	3.7	1,580
22	1,027	3.8	2,069	26	917	3.7	1,590
26	1,028	3.8	2,043	31	884	3.6	1,481
30	1,123	4.1	2,379	Nov. 5	886	3.6	1,424
May 6	1,258	4.35	3,149	9	887	3.6	1,442
11	1,298	4.65	4,147	13	889	3.6	1,410
15	1,276	4.8	4,302	17	888	3.6	1,421
19	1,345	5.0	4,912	22	877	3.6	1,367
23	1,646	4.9	4,695	26	869	3.6	1,355
27	1,585	4.9	4,824	30	877	3.55	1,350
June 3	1,148	4.3	3,040	Dec. 5	885	3.55	1,365
9	946	3.9	2,028	10	875	3.5	1,328
14	863	3.65	1,631	14	882	3.5	1,332
18	870	3.65	1,633	18	869	3.5	1,330
23	1,017	3.85	2,038	22	854	3.5	1,349
30	1,329	4.85	4,717	27	861	3.5	1,291
July 6	1,189	4.7	3,989	31	859	3.5	1,287

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Daily gage height, in feet, of Rio Grande below Devils River, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.25	4.0	3.6	3.9	4.1	4.45	4.75	3.5	4.2	4.5	3.6	3.55
2	4.65	4.0	3.55	3.9	4.0	4.35	4.7	3.45	4.1	4.35	3.6	3.55
3	4.4	3.9	3.55	3.9	4.0	4.3	5.2	3.45	4.0	4.4	3.6	3.55
4	4.35	3.9	3.5	3.9	4.05	4.25	5.55	3.45	4.0	4.75	3.6	3.55
5	4.3	3.8	3.5	4.0	4.2	4.2	4.95	3.45	3.95	4.5	3.6	3.55
6	4.35	3.8	3.5	4.0	4.35	4.1	4.75	3.45	10.7	4.25	3.6	3.55
7	4.35	3.8	3.5	4.1	4.5	4.6	5.25	3.45	7.5	4.05	3.6	3.55
8	4.3	3.8	3.5	4.1	4.75	4.05	4.9	3.4	5.6	4.0	3.6	3.55
9	4.3	3.8	3.5	5.1	4.7	3.9	4.7	3.4	4.85	3.95	3.6	3.5
10	4.2	3.8	3.5	4.3	4.8	3.85	4.7	3.4	4.4	3.9	3.6	3.5
11	4.1	3.7	3.5	4.25	4.65	3.8	4.75	3.4	4.2	3.9	3.6	3.5
12	4.2	3.7	3.5	4.2	4.65	3.75	4.3	3.4	4.85	3.85	3.6	3.5
13	4.2	3.7	3.5	4.0	4.7	3.75	4.2	3.4	4.85	3.8	3.6	3.5
14	4.1	3.7	3.45	4.0	4.75	3.65	4.15	3.4	4.65	3.8	3.6	3.5
15	4.1	3.8	3.45	3.9	4.9	3.6	4.25	3.4	4.9	3.8	3.6	3.5
16	4.15	3.7	3.45	3.9	5.45	3.6	4.35	3.45	4.7	3.75	3.6	3.5
17	4.25	3.7	3.45	3.9	5.05	3.6	4.25	3.4	4.6	3.75	3.6	3.5
18	4.1	3.7	3.5	3.85	5.15	3.7	4.15	3.4	4.5	3.7	3.6	3.5
19	4.15	3.7	3.45	3.85	5.0	3.7	3.95	3.4	4.35	3.7	3.6	3.5
20	4.1	3.7	3.55	3.8	6.5	3.7	3.85	3.4	4.2	3.7	3.6	3.5
21	4.05	3.7	3.8	3.8	5.4	4.05	3.8	3.4	4.2	3.7	3.6	3.5
22	4.0	3.65	3.95	3.8	5.0	4.05	3.75	3.5	4.15	3.7	3.6	3.5
23	4.0	3.65	4.1	3.8	4.9	3.8	3.75	3.7	4.1	3.7	3.6	3.5
24	3.9	3.65	4.05	3.8	4.9	3.75	3.7	3.65	5.15	3.7	3.6	3.5
25	3.9	3.6	3.95	3.8	4.9	3.6	3.6	3.8	4.95	3.7	3.6	3.5
26	3.9	3.6	3.9	3.8	4.9	4.05	3.6	3.95	4.9	3.7	3.6	3.5
27	3.9	3.6	3.9	3.8	4.9	5.15	3.6	4.55	4.65	3.65	3.55	3.5
28	3.9	3.6	3.9	3.85	4.95	5.8	3.5	4.8	4.5	3.65	3.55	3.5
29	3.9	.....	3.9	4.1	4.9	5.35	3.5	4.75	4.5	3.6	3.55	3.5
30	3.9	.....	3.9	4.1	4.9	4.8	3.5	4.65	4.4	3.6	3.55	3.5
31	3.9	.....	4.0	.....	4.6	.....	3.5	4.45	.....	3.6	.....	3.5

Daily discharge, in second-feet, of Rio Grande below Devils River, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,900	2,330	1,600	2,200	2,380	3,630	4,390	1,360	2,750	3,290	1,470	1,350
2	4,010	2,310	1,530	2,200	2,180	3,240	4,200	1,280	2,370	2,950	1,460	1,360
3	3,220	2,150	1,520	2,200	2,180	a3,040	5,540	1,270	2,170	3,060	1,450	1,360
4	3,060	2,120	1,440	2,200	2,320	2,910	6,470	1,270	2,170	3,870	1,430	1,360
5	a2,910	a1,960	a1,430	2,310	2,730	2,790	4,740	a1,260	a2,070	a3,290	a1,420	a1,370
6	3,020	1,950	1,430	a2,310	3,150	2,530	a4,120	1,280	27,440	2,780	1,430	1,360
7	3,010	1,950	1,430	2,510	3,530	3,800	5,450	1,290	15,180	2,380	1,430	1,360
8	2,890	1,940	1,430	2,510	4,170	2,410	4,520	1,240	7,880	2,280	1,440	1,360
9	a2,880	1,930	1,430	5,510	4,040	a2,030	3,990	1,260	5,000	a2,180	a1,440	1,330
10	2,640	a1,920	a1,430	a2,920	4,300	1,950	a3,990	a1,270	a3,440	2,080	1,430	a1,330
11	2,400	1,780	1,430	2,820	a4,150	1,870	4,120	1,260	3,020	2,080	1,430	1,330
12	2,640	1,780	1,430	2,730	4,150	1,790	2,930	1,250	4,320	1,990	1,420	1,330
13	a2,640	1,780	1,430	2,350	4,200	1,790	2,660	1,240	4,320	a1,890	a1,410	1,330
14	2,520	a1,780	a1,390	a2,350	4,250	a1,630	2,530	1,230	a3,760	1,880	1,410	a1,330
15	2,520	1,910	1,390	2,220	a4,610	1,550	a2,700	a1,220	4,470	1,860	1,420	1,330
16	2,580	1,760	1,390	2,220	6,280	1,550	2,870	1,270	3,900	1,770	1,420	1,330
17	2,700	a1,750	1,390	2,220	5,060	1,550	2,700	1,210	3,610	1,760	a1,420	1,330
18	a2,520	1,740	a1,450	2,150	5,370	a1,730	2,530	1,210	a3,330	a1,670	1,410	a1,330
19	2,570	1,730	1,390	a2,150	a4,910	1,730	2,190	a1,210	3,000	1,650	1,400	1,330
20	2,520	1,720	1,560	2,070	11,760	1,730	a2,020	1,210	2,670	1,620	1,390	1,340
21	2,460	1,720	1,980	2,070	6,690	2,440	1,940	1,210	2,650	1,600	1,380	1,350
22	a2,410	1,650	2,240	a2,070	5,080	2,440	1,850	1,380	a2,520	a1,580	a1,370	a1,350
23	2,410	1,640	a2,490	2,060	a4,700	a1,940	1,850	a1,740	2,420	1,580	1,360	1,340
24	2,260	a1,640	2,430	2,060	4,730	1,840	1,770	1,640	5,220	1,590	1,360	1,330
25	2,260	1,620	2,310	2,050	4,760	1,540	1,610	1,930	4,640	1,590	1,360	1,320
26	2,260	1,620	2,250	a2,040	4,790	2,680	a1,610	2,220	a4,520	a1,590	a1,360	1,300
27	a2,260	1,620	a2,250	2,040	a4,820	5,480	1,610	a3,490	3,840	1,540	1,350	a1,290
28	2,250	a1,620	2,250	2,100	4,920	8,200	1,420	4,110	3,410	1,540	1,350	1,290
29	2,240	.....	2,250	2,380	4,820	6,120	1,400	3,970	3,360	1,480	1,350	1,290
30	2,230	.....	2,250	a2,380	4,820	a4,590	1,380	3,670	a3,060	1,480	a1,350	1,290
31	2,220	.....	a2,330	.....	4,220	.....	1,360	a3,080	.....	a1,480	.....	a1,290

a Date of measurement.

Monthly discharge of Rio Grande below Devils River, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	5,900	2,220	2,723	167,425
February	2,330	1,620	1,836	101,990
March	2,490	1,390	1,740	107,008
April	5,510	2,040	2,380	141,620
May	11,760	2,180	4,518	277,825
June	8,200	1,540	2,751	163,676
July	6,470	1,360	2,983	183,392
August	4,110	1,210	1,727	106,175
September	27,440	2,070	4,744	282,307
October	3,870	1,480	2,045	125,712
November	1,470	1,350	1,404	83,544
December	1,370	1,290	1,332	81,898
The year	11,760	1,210	2,520	1,822,572

RIO GRANDE AT EAGLE PASS, TEX.

The station was established in April, 1900, by the International Boundary Commission. It is one-half mile above the highway bridge between Eagle Pass, Tex., and Ciudad Porfirio Diaz, Mexico, and about 540 miles below El Paso.

The right bank is alluvial deposit, with a bottom back of it about 1,500 feet wide, which begins to overflow at gage height 22 feet. The left bank is shale rock rising abruptly from the river. The bed of the stream is constantly shifting, and frequent discharge measurements are necessary to determine closely the daily discharge. The section is subject to overflow at high stages. At low water the depth is considerable and the velocity slow.

The observations at this station have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Rio Grande at Eagle Pass, Tex., in 1910.

[By J. K. Wilson.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	1,682	2.8	5,054	Mar. 16	816	0.8	1,076
6	1,434	2.0	3,034	19	823	0.8	1,076
9	1,407	1.9	2,943	22	1,040	1.5	1,874
20	1,333	1.8	2,684	25	1,080	1.5	1,901
27	1,195	1.5	2,304	28	1,048	1.5	1,741
31	1,141	1.5	2,198	31	1,276	2.05	2,971
Feb. 3	1,189	1.5	2,436	Apr. 3	1,474	1.7	2,922
6	1,214	1.5	2,457	6	1,112	1.7	2,481
9	1,139	1.4	2,229	10	2,070	3.75	8,502
12	1,110	1.3	2,073	13	1,376	2.0	3,120
15	1,091	1.3	1,978	16	1,385	1.5	2,501
18	1,088	1.2	1,958	19	1,390	1.5	2,533
21	1,098	1.2	1,942	22	1,316	1.4	2,361
24	1,074	1.2	1,917	25	1,343	1.3	2,240
28	1,091	1.2	1,924	28	1,254	1.2	1,997
Mar. 3	937	1.0	1,435	30	1,244	1.25	1,972
6	962	1.0	1,454	May 3	1,290	1.5	2,263
9	934	0.9	1,347	6	1,275	1.5	2,201
13	849	0.8	1,145	9	1,705	2.5	4,043

Discharge measurements of Rio Grande at Eagle Pass, Tex., in 1910—Continued.

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 13	1,694	2.5	3,990	Sept. 8	3,589	4.85	14,701
16	1,714	2.7	4,867	12	2,054	1.5	4,556
19	2,149	3.1	5,798	15	2,538	3.0	6,846
22	2,130	3.1	6,140	18	1,898	2.3	4,023
26	1,811	2.7	5,389	21	1,883	1.6	4,877
28	1,748	2.5	4,817	24	1,708	1.6	4,219
31	1,716	2.6	5,092	27	2,125	2.5	5,364
June 3	1,344	2.3	3,870	30	1,906	2.0	4,519
6	1,279	2.0	3,625	Oct. 3	1,890	1.9	4,948
9	1,223	1.5	3,166	6	1,856	2.05	4,267
12	1,106	1.2	2,621	9	1,557	1.5	3,159
15	960	1.1	1,913	12	1,482	1.5	2,951
18	961	1.0	2,152	15	1,409	1.5	2,717
21	955	1.0	1,888	18	1,352	1.0	2,245
24	1,099	1.0	2,124	21	1,327	1.0	2,268
28	1,591	2.4	5,814	24	1,312	0.9	2,174
30	1,706	3.0	6,254	27	1,315	.9	2,076
July 3	1,577	2.4	5,944	31	1,299	.8	1,878
7	1,634	2.6	5,449	Nov. 3	1,273	.8	1,791
10	1,445	2.3	3,877	6	1,256	.8	1,760
13	1,139	1.65	2,324	9	1,232	.7	1,653
16	1,219	1.5	2,276	12	1,250	.7	1,625
19	1,166	1.5	2,210	15	1,247	.7	1,720
22	1,151	1.5	2,148	19	1,259	.7	1,611
25	1,116	1.2	2,098	21	1,262	.7	1,659
28	1,048	1.2	1,964	24	1,258	.7	1,661
31	990	1.0	1,669	27	1,284	.7	1,602
Aug. 3	877	.7	1,314	30	1,266	.7	1,606
6	849	.6	1,234	Dec. 3	1,251	.7	1,659
10	836	.6	1,140	6	1,272	.7	1,605
13	807	.6	1,089	9	1,242	.7	1,584
16	831	.6	1,169	12	1,274	.7	1,650
19	855	.6	1,258	15	1,270	.7	1,648
22	859	.6	1,178	18	1,262	.7	1,673
25	879	.6	1,228	21	1,258	.7	1,683
28	1,336	1.95	2,879	24	1,255	.7	1,646
31	1,461	2.3	3,441	27	1,240	.7	1,582
Sept. 3	1,083	1.7	2,264	31	1,223	.7	1,575
6	986	1.4	1,803				

Daily gage height, in feet, of Rio Grande at Eagle Pass, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.65	1.5	1.0	1.9	1.5	2.55	2.4	0.75	2.05	2.0	0.8	0.7
2	3.1	1.5	1.0	1.7	1.5	2.45	2.4	.7	1.85	2.15	.8	.7
3	2.85	1.5	1.0	1.7	1.5	2.3	2.4	.7	1.7	1.9	.8	.7
4	2.8	1.5	1.0	1.7	1.5	2.1	2.5	.65	1.6	2.05	.8	.7
5	2.3	1.5	1.0	1.7	1.5	2.0	2.95	.6	1.6	3.2	.8	.7
6	2.0	1.45	1.0	1.7	1.5	2.0	2.7	.6	1.4	2.2	.8	.7
7	2.0	1.4	1.0	1.7	1.75	1.95	2.6	.6	10.2	1.75	.8	.7
8	2.0	1.4	1.0	1.8	2.35	1.7	2.8	.6	4.4	1.55	.7	.7
9	1.9	1.3	.9	5.1	2.5	1.45	2.7	.6	2.95	1.5	.7	.7
10	1.9	1.3	.9	3.35	2.5	1.25	2.3	.6	2.7	1.5	.7	.7
11	1.8	1.3	.9	2.3	2.5	1.2	2.3	.6	2.3	1.5	.7	.7
12	1.8	1.3	.8	2.0	2.5	1.2	1.8	.6	1.6	1.5	.7	.7
13	1.75	1.3	.8	2.0	2.5	1.2	1.65	.6	2.25	1.5	.7	.7
14	1.7	1.3	.8	2.25	2.5	1.1	1.5	.6	2.5	1.5	.7	.7
15	1.7	1.3	.8	1.85	2.6	1.05	1.5	.6	2.9	1.5	.7	.7
16	1.7	1.3	.8	1.5	2.7	1.0	1.5	.6	2.7	1.1	.7	.7
17	1.85	1.25	.8	1.5	3.25	1.0	1.5	.6	2.5	1.1	.7	.7
18	2.0	1.2	.8	1.5	3.1	1.0	1.5	.6	2.3	1.0	.7	.7
19	1.95	1.2	2.55	1.5	3.1	1.0	1.5	.6	2.25	1.0	.7	.7
20	1.85	1.2	1.3	1.5	4.25	1.0	1.5	.6	1.6	1.0	.7	.7
21	1.8	1.2	1.3	1.4	4.55	1.0	1.5	.6	1.6	1.0	.7	.7
22	1.8	1.2	1.5	1.4	3.1	1.0	1.5	.6	1.6	1.0	.7	.7
23	1.75	1.2	1.5	1.3	2.7	1.0	1.5	.6	1.6	.9	.7	.7
24	1.7	1.2	1.55	1.3	2.6	1.0	1.2	.6	1.6	.9	.7	.7
25	1.7	1.2	1.5	1.3	2.65	1.0	1.2	.75	3.1	.9	.7	.7
26	1.7	1.2	1.5	1.2	2.7	1.0	1.2	1.3	2.8	.9	.7	.7
27	1.5	1.2	1.5	1.2	2.7	1.0	1.2	1.4	2.5	.9	.7	.7
28	1.5	1.2	1.5	1.2	2.5	2.4	1.2	1.75	2.3	.9	.7	.7
29	1.5	.....	1.5	1.2	2.5	4.1	1.2	1.85	2.1	.9	.7	.7
30	1.5	.....	2.95	1.35	2.5	3.0	1.2	1.75	2.0	.9	.7	.7
31	1.5	.....	2.25	.....	2.6	.....	.95	2.3	.....	.8	.....	.7

Daily discharge, in second-feet, of Rio Grande at Eagle Pass, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,770	2,280	1,620	2,950	2,260	4,830	5,940	1,370	2,950	4,720	1,850	1,620
2	5,360	2,360	1,530	2,920	2,260	4,430	5,940	1,310	2,560	5,170	1,820	1,640
3	a5,150	a2,440	a1,430	a2,920	a2,260	a3,870	a5,940	a1,310	a2,260	a4,950	a1,790	a1,660
4	5,050	2,440	1,440	2,780	2,240	3,710	6,140	1,270	2,110	5,210	1,780	1,640
5	3,790	2,450	1,450	2,630	2,220	3,620	7,040	1,230	2,110	7,180	1,770	1,620
6	a3,030	a2,460	a1,450	a2,480	a2,200	a3,620	5,900	a1,230	a1,800	a4,640	a1,760	a1,610
7	3,030	2,360	1,450	2,480	2,660	3,580	a5,450	1,210	53,000	3,660	1,760	1,600
8	3,030	2,270	1,450	2,600	3,760	3,350	5,850	1,190	a13,340	3,260	1,650	1,590
9	a2,940	2,230	a1,350	14,800	a4,040	a3,120	5,460	1,160	8,950	a3,160	a1,650	a1,580
10	2,930	a2,110	1,320	a7,200	4,030	2,830	a3,880	a1,140	8,190	3,090	1,640	1,610
11	2,780	2,090	1,300	3,790	4,020	2,700	3,880	1,120	6,980	3,020	1,640	1,630
12	2,770	a2,070	1,170	3,120	4,000	a2,620	2,680	1,110	a4,860	a2,950	a1,630	a1,650
13	2,690	2,040	a1,150	a3,120	a3,990	2,420	a2,320	a1,090	5,690	2,870	1,660	1,650
14	2,610	2,010	1,120	3,620	4,080	2,110	2,280	1,120	6,080	2,800	1,690	1,650
15	2,600	a1,980	1,100	3,020	4,470	a1,860	2,280	1,140	a6,690	a2,720	a1,720	a1,650
16	2,590	1,980	a1,080	a2,500	a4,870	1,930	a2,280	1,170	5,700	2,340	1,690	1,660
17	2,790	1,970	1,080	2,510	6,520	2,040	2,250	1,200	4,860	2,340	1,670	1,660
18	2,990	a1,960	1,080	2,520	5,800	a2,150	2,230	1,230	a4,020	a2,250	1,640	a1,670
19	2,900	1,950	a4,430	a2,530	a5,800	2,060	a2,210	a1,260	4,160	2,250	a1,610	1,680
20	a2,750	1,950	1,650	2,520	10,790	1,980	2,190	1,230	3,390	2,260	1,640	1,680
21	2,680	a1,940	1,650	2,380	12,120	a1,890	2,170	1,200	3,600	a2,270	a1,660	a1,680
22	2,680	1,930	a1,870	a2,360	a6,140	1,970	a2,150	a1,180	3,800	2,270	1,660	1,670
23	2,620	1,930	1,880	2,240	5,390	2,050	2,150	1,190	4,010	2,170	1,660	1,660
24	2,560	a1,920	1,940	2,240	5,190	a2,120	2,100	1,210	a4,220	a2,170	a1,660	a1,650
25	2,560	1,920	a1,900	a2,240	5,390	2,120	a2,100	a1,410	6,470	2,140	1,640	1,630
26	2,560	1,920	1,850	2,080	a5,390	2,120	2,050	2,080	5,920	2,110	1,620	1,600
27	a2,300	1,920	1,790	2,040	5,390	2,120	2,010	2,200	a5,360	a2,080	a1,600	a1,580
28	2,280	1,920	a1,740	a2,000	a4,820	a5,810	a1,960	a2,680	5,030	2,050	1,600	1,580
29	2,250	.....	1,740	2,000	4,820	10,900	1,920	2,780	4,690	2,030	1,600	1,580
30	2,220	.....	5,430	a2,090	4,820	a6,250	1,870	2,680	4,520	2,000	a1,610	1,580
31	a2,200	.....	a3,520	.....	a5,090	.....	a1,620	a3,440	.....	a1,880	.....	a1,570

a Date of measurement.

Monthly discharge of Rio Grande at Eagle Pass, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	5,630	2,200	3,024	185,911
February	2,460	1,920	2,100	116,628
March	5,430	1,080	1,773	109,012
April	14,800	2,000	3,156	187,795
May	12,120	2,200	4,736	291,233
June	10,900	1,860	3,206	190,770
July	7,040	1,620	3,363	206,757
August	3,440	1,090	1,488	91,517
September	53,000	1,800	6,577	391,379
October	7,180	1,880	3,033	186,466
November	1,850	1,600	1,679	99,908
December	1,680	1,570	1,630	100,225
The year	1,080	53,000	2,980	2,157,601

RIO GRANDE NEAR LAREDO, TEX.

The station was established near Nuevo Laredo, Mexico, in April, 1900, by the International Boundary Commission. It was intended to measure the river from the highway bridge connecting Laredo, Tex., with Nuevo Laredo, Tamaulipas, and the gage was established on the right bank just above the bridge. Measurements were kept up

by the Mexican section of the commission until September 24, 1900, and gage heights were read until February 28, 1903, but the results were so conflicting that the station was abandoned. In July, 1903, a cable station was established by the commission about 2 miles above Nuevo Laredo, and on August 1, 1903, regular meter measurements and gage heights were started. The new gage heights are not comparable with the old. The station is about 670 miles below El Paso.

The river bed at the new station is constantly shifting, and frequent discharge measurements are made to determine closely the daily discharge. The banks at the new station are not subject to overflow.

The observations at these stations have been made under the direction of the Mexican section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements and gage heights for the years 1900 to 1904, which had not hitherto been published by the United States Geological Survey, are given in Water-Supply Paper 248.

Discharge measurements of Rio Grande near Laredo, Tex., in 1910.

[By L. Varela.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	1,940	4.5	6,041	July 7	1,573	4.05	4,139
11	1,545	3.3	2,731	9	1,778	4.15	5,228
18	1,432	2.9	2,374	16	1,520	2.9	2,370
21	1,473	3.1	2,614	22	1,351	2.5	1,868
25	1,428	2.9	2,248	27	1,226	2.2	1,469
31	1,356	2.7	2,232	31	1,133	1.9	1,242
Feb. 5	1,396	2.7	2,306	Aug. 5	1,097	1.8	1,011
11	1,310	2.5	1,862	11	1,031	1.6	1,103
16	1,259	2.3	1,777	16	960	1.6	967
20	1,205	2.3	1,605	20	919	1.7	1,024
25	1,206	2.2	1,669	26	1,052	1.6	1,270
28	1,194	2.2	1,601	30	1,849	3.8	4,127
Mar. 5	1,153	2.0	1,460	31	1,793	3.95	4,391
12	1,148	2.0	1,552	Sept. 6	1,443	2.7	2,343
17	1,085	1.9	1,216	8	4,598	10.75	26,160
21	1,638	3.65	3,699	14	2,370	4.1	5,259
26	1,347	2.6	2,167	20	1,622	3.6	4,050
31	1,329	2.55	1,995	26	1,439	2.9	2,619
Apr. 7	1,318	2.7	2,194	30	1,602	3.7	3,890
10	3,058	7.4	16,802	Oct. 4	2,851	7.4	14,240
15	1,487	3.1	2,645	11	1,330	2.7	2,459
21	1,331	2.6	1,973	15	1,260	2.6	2,193
26	1,296	2.4	1,892	20	1,182	2.4	1,880
30	1,364	2.6	2,083	26	1,164	2.3	1,881
May 5	1,437	2.7	2,272	31	1,128	2.1	1,545
8	1,569	3.0	2,818	Nov. 5	1,141	2.1	1,685
13	1,786	3.8	4,299	10	1,102	2.1	1,579
18	2,831	6.6	13,130	21	1,085	2.1	1,559
26	1,742	3.8	4,336	26	1,025	2.1	1,417
31	2,236	4.1	4,760	30	1,089	2.1	1,507
June 6	1,632	3.5	3,452	Dec. 6	1,079	2.0	1,541
11	1,447	2.7	2,313	11	1,080	2.0	1,578
15	1,225	2.2	1,717	16	1,052	2.1	1,557
20	1,139	1.9	1,427	21	1,055	2.1	1,335
25	1,448	2.8	2,408	26	1,027	2.0	1,295
26	1,788	4.25	5,040	30	1,062	2.0	1,536
30	2,196	4.7	7,241				

Daily gage height, in feet, of Rio Grande near Laredo, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.4	2.7	2.1	4.05	2.8	4.9	4.35	1.9	4.05	3.4	2.1	2.1
2	2.4	2.7	2.1	3.5	2.8	3.75	3.95	1.9	3.7	3.3	2.1	2.1
3	4.45	2.7	2.05	3.0	2.8	3.55	3.65	1.9	3.3	3.45	2.0	2.0
4	4.25	2.7	2.0	2.75	2.8	3.65	3.35	1.85	3.05	7.05	2.2	2.0
5	4.05	2.7	2.0	2.7	2.65	4.15	3.65	1.8	2.9	5.35	2.1	2.0
6	3.85	2.7	2.0	2.65	2.6	3.5	4.05	1.8	2.7	4.65	2.1	2.0
7	3.65	2.65	2.0	2.65	2.65	3.05	3.95	1.8	2.8	3.95	2.1	2.0
8	3.5	2.6	2.0	2.8	3.05	2.95	3.75	1.7	10.8	3.6	2.1	2.0
9	3.4	2.55	2.0	2.8	3.45	2.7	4.15	1.6	5.25	3.35	2.1	2.0
10	3.35	2.5	2.0	6.85	3.8	2.65	4.05	1.6	4.45	3.15	2.1	2.0
11	3.25	2.45	1.95	5.35	3.7	2.6	3.65	1.6	4.2	2.7	2.1	2.0
12	3.15	2.4	2.0	4.3	3.9	2.55	3.55	1.6	3.7	2.7	2.1	2.0
13	3.1	2.4	2.0	3.8	3.75	2.3	3.25	1.6	3.4	2.7	2.1	2.0
14	3.2	2.35	1.9	3.25	3.7	2.2	3.1	1.6	4.65	2.6	2.2	2.05
15	3.15	2.3	1.9	3.1	3.7	2.15	3.05	1.6	4.8	2.6	2.2	2.1
16	3.05	2.3	1.9	3.75	3.75	2.1	2.9	1.6	5.7	2.5	2.1	2.1
17	3.0	2.3	1.9	3.15	3.9	2.1	3.1	1.55	4.2	2.45	2.1	2.1
18	2.9	2.3	1.8	2.85	6.4	2.1	3.4	1.6	3.85	2.4	2.1	2.1
19	3.15	2.3	1.9	2.7	4.6	1.95	3.0	1.65	3.65	2.4	2.1	2.0
20	3.15	2.3	2.0	2.6	4.1	1.9	2.85	1.7	3.55	2.4	2.1	2.05
21	3.1	2.3	3.45	2.55	4.95	2.05	2.55	1.7	3.3	2.35	2.1	2.1
22	3.05	2.3	2.35	2.5	5.45	2.1	2.5	1.65	3.2	2.2	2.1	2.1
23	2.95	2.3	2.25	2.5	4.4	2.1	2.45	1.6	3.1	2.1	2.2	2.1
24	2.9	2.2	2.3	2.5	3.95	2.1	2.4	1.6	3.0	2.1	2.1	2.05
25	2.85	2.2	2.5	2.45	3.8	4.0	2.3	1.6	2.9	2.2	2.2	2.0
26	2.8	2.2	2.6	2.4	3.8	3.7	2.2	1.8	3.35	2.3	2.2	2.0
27	2.75	2.2	2.75	2.5	3.85	2.4	2.2	2.1	4.1	2.3	2.2	2.0
28	2.7	2.2	2.6	2.45	4.05	2.25	2.2	2.3	3.9	2.3	2.1	2.0
29	2.65	.....	2.5	2.5	4.15	2.25	2.1	2.45	3.7	2.25	2.1	2.0
30	2.7	.....	2.5	2.65	4.2	4.75	2.05	3.7	3.6	2.15	2.1	2.0
31	2.7	.....	2.55	.....	4.1	.....	1.9	3.95	.....	2.1	.....	2.0

RIO GRANDE NEAR ROMA, TEX.

The station was established in 1900 by the International Boundary Commission. It is near Roma, Tex., 775 miles, by river, below El Paso.

The right bank is alluvial deposits and overflows in high water for a width of 250 feet. The overflow section is thickly covered with mesquite brush. The left bank is of hard material, and does not overflow.

The river bed is constantly shifting, and frequent discharge measurements are necessary to determine closely the daily discharge.

The highest recorded flood, September 16, 1904, marked 26 feet on the gage.

The observations at this section have been made under the direction of the Mexican section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements and gage heights for the years 1900 to 1904, which had not hitherto been published by the United States Geological Survey, are given in Water-Supply Paper 248.

Discharge measurements of Rio Grande near Roma, Tex., in 1910.

[By H. P. Guerra.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 2	1,513	3.6	2,803	July 2	2,668	6.0	8,093
6	2,565	5.6	6,819	6	2,194	4.8	4,795
10	2,459	5.0	5,483	10	2,331	5.2	5,590
14	2,417	4.8	4,857	14	1,954	4.4	3,475
18	1,988	4.3	3,442	18	1,523	3.8	2,897
22	1,993	4.3	3,458	22	1,683	4.2	3,312
26	1,989	4.3	3,452	26	1,260	3.2	2,253
30	1,585	3.8	3,059	31	1,156	3.0	2,030
Feb. 2	1,595	3.8	3,091	Aug 2	1,152	3.0	2,025
6	1,558	3.8	3,038	6	736	2.5	1,204
10	1,546	3.8	3,026	10	698	2.4	1,134
14	1,546	3.8	3,030	14	678	2.3	1,042
17	1,522	3.6	2,828	18	678	2.3	1,049
20	1,320	3.2	2,337	22	660	2.3	1,039
24	1,323	3.2	2,355	26	656	2.3	1,034
26	1,317	3.2	2,332	31	1,372	3.8	2,409
Mar. 2	1,164	3.0	2,045	Sept. 1	4,180	9.2	18,341
6	1,166	3.0	2,047	5	2,406	5.5	6,394
10	1,166	3.0	2,051	9	5,450	11.8	28,003
14	1,075	2.8	1,855	14	4,704	11.0	24,084
18	1,080	2.8	1,867	17	9,184	20.0	77,338
23	2,573	5.6	6,853	20	5,739	12.8	30,600
27	1,507	3.6	2,799	24	3,331	7.1	14,032
31	1,501	3.6	2,758	27	2,968	6.3	9,950
Apr. 2	2,529	5.6	6,719	30	2,970	6.3	9,953
6	2,177	4.8	4,755	Oct. 2	2,836	6.2	8,762
10	2,089	4.5	3,725	4	3,970	8.7	17,888
11	3,139	6.6	11,378	9	2,623	5.9	7,753
15	2,167	4.8	4,702	14	1,988	4.5	3,792
19	1,576	4.2	3,027	18	1,954	4.4	3,487
22	1,559	4.0	2,955	22	1,613	4.0	3,057
26	1,325	3.2	2,347	26	1,540	3.8	2,711
29	1,335	3.3	2,371	31	1,510	3.8	2,645
May 1	1,291	3.2	2,311	Nov. 2	1,529	3.8	2,660
5	1,509	3.8	2,879	6	1,413	3.6	2,358
9	2,484	5.6	6,604	10	1,409	3.6	2,342
14	2,338	5.2	5,601	14	1,361	3.4	2,096
19	3,575	7.7	16,133	18	1,361	3.4	2,099
23	3,352	7.3	15,197	22	1,362	3.4	2,100
26	2,321	5.2	5,576	26	1,364	3.4	2,106
30	2,470	5.6	6,565	30	1,360	3.4	2,095
June 2	2,553	5.8	7,593	Dec. 2	1,300	3.3	2,001
7	3,869	8.2	17,443	6	1,233	3.1	1,873
10	2,325	5.2	5,575	10	1,203	3.0	1,620
14	1,968	4.4	3,511	14	1,191	3.0	1,576
18	1,313	3.2	2,265	18	1,254	3.2	1,924
22	1,173	3.0	2,065	22	1,188	3.0	1,573
25	1,165	3.0	2,041	26	1,186	3.0	1,573
27	2,360	5.3	5,735	30	1,188	3.0	1,575
30	1,573	4.0	2,976				

Daily gage height, in feet, of Rio Grande near Roma, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.4	3.8	3.15	3.6	3.25	5.6	4.85	3.0	8.25	6.2	3.8	3.3
2	3.5	3.8	3.05	5.25	3.5	5.7	5.85	2.95	9.55	6.2	3.8	3.3
3	3.6	3.8	3.0	3.55	3.75	5.4	5.5	2.8	7.75	6.2	3.8	3.2
4	4.4	3.8	3.0	3.5	4.0	5.35	5.1	2.8	5.35	8.5	3.7	3.2
5	5.1	3.8	3.0	3.6	3.7	5.3	4.85	2.7	4.9	8.3	3.6	3.1
6	5.4	3.8	3.0	4.75	3.6	5.5	4.75	2.65	4.6	7.05	3.6	3.0
7	5.35	3.75	3.0	3.8	3.35	7.6	5.1	2.6	4.35	6.4	3.6	3.0
8	5.25	3.7	3.1	3.7	3.6	6.25	5.6	2.5	4.2	6.0	3.6	3.0
9	5.1	3.8	3.0	3.7	5.2	5.2	5.2	2.4	10.85	5.65	3.6	3.0
10	5.0	3.8	2.95	5.05	4.4	5.2	5.35	2.4	7.9	5.15	3.6	3.0
11	5.0	3.7	2.9	7.2	5.1	4.5	5.55	2.3	6.6	4.95	3.5	3.0
12	4.9	3.7	2.9	7.05	5.15	4.3	5.05	2.3	5.65	4.75	3.5	3.0
13	4.9	3.7	2.8	5.9	5.2	4.35	4.75	2.3	5.35	4.65	3.5	3.0
14	4.8	3.6	2.8	5.25	5.3	4.35	4.5	2.3	6.95	4.6	3.4	3.0
15	4.8	3.5	2.8	4.9	5.2	3.8	4.4	2.3	13.0	4.5	3.4	3.0
16	4.65	3.4	2.75	4.45	5.5	3.5	4.15	2.3	19.75	4.45	3.4	3.0
17	4.45	3.35	2.7	4.95	5.8	3.35	3.95	2.3	19.25	4.4	3.4	3.05
18	4.35	3.3	2.8	4.65	6.45	3.3	3.8	2.3	16.2	4.35	3.4	3.25
19	4.3	3.3	2.7	4.25	7.5	3.2	4.05	2.3	13.95	4.25	3.5	3.1
20	4.3	3.2	2.8	4.2	6.35	3.2	4.25	2.3	11.9	4.15	3.5	3.1
21	4.3	3.2	3.05	4.2	5.8	3.1	4.25	2.3	8.9	4.05	3.4	3.1
22	4.35	3.2	4.0	4.1	7.1	3.1	4.1	2.3	7.75	3.95	3.4	3.0
23	4.4	3.2	5.25	3.7	6.9	3.0	3.75	2.2	7.1	3.85	3.4	3.0
24	4.3	3.2	4.65	3.5	5.9	3.0	3.5	2.2	7.0	3.8	3.4	3.0
25	4.3	3.1	3.95	3.3	5.45	3.4	3.4	2.3	6.75	3.8	3.4	3.0
26	4.25	3.2	3.75	3.3	5.1	4.6	3.25	2.3	6.55	3.8	3.4	3.0
27	4.05	3.2	3.6	3.35	5.0	5.15	3.2	2.5	6.35	3.8	3.4	3.0
28	3.95	3.15	3.75	3.3	5.05	4.25	3.2	3.0	6.85	3.8	3.4	3.0
29	3.9	.....	3.75	3.3	5.25	4.0	3.2	3.2	6.65	3.8	3.4	3.0
30	3.8	.....	3.65	3.2	5.4	3.8	3.15	3.35	6.25	3.8	3.4	3.0
31	3.8	.....	3.6	.....	5.6	.....	3.0	4.45	.....	3.8	.....	3.0

RIO GRANDE NEAR BROWNSVILLE, TEX.

This station was established in 1900 by the International Boundary Commission. It is about 1 mile above Brownsville, Tex., and opposite Matamoros, Tamaulipas, Mex., and 900 miles by river below El Paso.

Between Roma and Brownsville there are many lagoons (old river beds) which take river water during moderate floods, and a large area overflows quite deeply in larger floods. Much of this water returns slowly to the river as the flood subsides, so that the flow passes Brownsville more uniformly than it passes Roma. Large quantities of water also leave the river entirely, reaching the Gulf of Mexico through channels remote from the Rio Grande. Local run-off, however, keeps the total water at Brownsville well up toward the combined flow of the San Juan and the Rio Grande at Roma. Both banks are alluvial and are just about level with high water. The right bank is protected by piling.

As the bed of the river is constantly shifting, frequent discharge measurements are made to determine closely the daily flow.

The observations at this station have been made under the direction of the Mexican section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements and gage heights for the years 1900 to 1904, which had not hitherto been published by the United States Geological Survey, are given in Water-Supply Paper 248.

Discharge measurements of Rio Grande near Brownsville, Tex., in 1910.

[By P. Guerra.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	1,920	2.8	3,134	July 3	1,585	2.4	2,848
7	1,994	3.1	3,541	7	1,856	3.2	3,754
11	2,268	4.6	5,172	11	2,034	3.8	4,292
15	2,032	3.8	4,461	15	1,890	3.3	3,932
19	1,960	3.5	4,185	19	1,500	1.8	2,442
23	1,968	3.0	3,418	23	1,395	1.4	2,274
27	1,998	3.1	3,557	27	1,215	.8	1,650
31	1,872	2.6	2,978	30	1,188	.4	1,444
Feb. 3	1,580	2.4	2,879	Aug. 3	1,114	− .2	1,109
7	1,568	2.3	2,837	7	1,080	− .4	1,062
11	1,552	2.1	2,758	11	988	− .8	870
15	1,469	1.7	2,485	15	955	−1.0	785
19	1,415	1.5	2,300	19	922	−1.1	705
23	1,348	1.2	2,166	23	891	−1.2	649
27	1,340	1.1	2,100	27	868	−1.3	598
Mar. 3	1,289	.9	1,955	31	997	− .8	890
7	1,222	.6	1,819	Sept. 3	3,466	8.55	19,075
11	1,166	.4	1,660	7	2,753	5.8	5,252
15	1,147	.3	1,604	11	4,374	11.0	19,882
19	1,105	.2	1,471	15	3,164	6.9	6,384
23	1,107	.2	1,447	19	5,373	13.7	22,540
27	1,934	2.8	3,206	23	5,514	14.2	24,708
31	1,409	1.5	2,329	27	4,536	11.3	20,827
Apr. 3	1,462	1.7	2,435	30	4,002	9.7	9,847
7	2,214	4.4	4,920	Oct. 3	3,774	9.0	8,997
11	1,573	2.4	2,877	7	5,416	14.0	25,497
15	2,562	6.0	5,113	11	3,436	8.0	8,123
19	1,926	3.4	4,046	15	3,032	6.5	5,888
23	1,567	2.4	2,852	19	2,615	5.7	4,707
27	1,392	1.4	2,255	23	2,495	5.0	4,538
30	1,316	1.1	2,026	27	2,337	4.5	4,118
May 3	1,282	.9	1,939	31	2,291	4.3	3,876
7	1,324	1.1	2,052	Nov. 3	2,252	4.2	3,585
11	1,573	2.4	2,872	7	2,137	3.6	3,066
15	1,666	2.7	3,122	11	2,049	3.0	2,834
19	1,642	2.6	3,003	15	1,965	2.8	2,642
23	2,472	6.2	5,403	19	1,940	2.6	2,515
27	2,525	6.4	5,676	23	1,887	2.4	2,340
31	2,044	3.8	4,316	27	1,911	2.5	2,409
June 3	2,094	4.0	4,484	Dec. 1	1,839	2.2	2,233
7	1,998	3.7	4,140	5	1,739	1.9	2,174
11	2,248	4.5	5,096	9	1,654	1.6	1,988
15	1,624	2.6	2,957	13	1,773	2.0	2,291
19	1,395	1.4	2,238	17	1,706	1.8	2,098
23	1,185	.4	1,455	21	1,737	1.9	2,197
27	1,127	.2	1,275	25	1,799	2.1	2,401
30	1,848	3.2	3,680	29	1,684	1.7	2,068

Daily gage height, in feet, of Rio Grande near Brownsville, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.8	2.5	1.05	1.7	1.05	3.8	2.85	0.2	0.8	9.65	4.3	2.2
2	2.8	2.45	1.0	1.6	1.0	3.9	1.9	.1	.9	9.3	4.25	2.05
3	2.75	2.35	.9	1.6	.95	3.95	2.2	− .1	8.0	8.95	4.2	1.8
4	2.7	2.3	.8	2.2	.9	4.25	2.7	− .3	13.1	8.8	4.05	1.85
5	2.7	2.3	.75	3.0	.95	4.15	3.2	− .3	11.7	10.25	3.85	1.9
6	2.85	2.3	.7	3.75	1.0	3.95	3.75	− .4	7.65	13.95	3.7	2.0
7	3.25	2.3	.6	4.35	1.1	3.6	3.3	− .4	6.1	14.0	3.6	2.05
8	3.7	2.2	.5	4.55	1.2	3.55	3.0	− .4	5.15	11.25	3.45	1.85
9	4.1	2.2	.4	3.75	1.95	4.8	2.95	− .45	4.55	9.3	3.25	1.55
10	4.45	2.1	.4	3.05	2.25	5.0	3.5	− .65	7.2	8.5	3.05	1.7
11	4.55	2.1	.4	2.4	2.35	4.65	3.75	− .75	10.0	7.85	3.0	1.8
12	4.4	2.1	.4	2.7	2.45	3.9	3.55	− .9	8.05	7.35	2.9	1.95
13	4.05	2.0	.4	3.55	2.55	3.5	3.4	− .9	6.95	7.0	2.9	2.0
14	3.95	1.85	.4	6.0	2.6	2.95	3.35	−1.0	5.9	6.65	2.8	2.1
15	3.8	1.75	.35	6.2	2.7	2.65	3.25	−1.0	6.35	6.5	2.75	2.0
16	3.7	1.65	.3	5.3	2.7	2.2	2.95	−1.0	7.65	6.4	2.7	1.9
17	3.6	1.55	.3	4.8	2.8	1.8	2.6	−1.05	13.45	6.3	2.7	1.8
18	3.6	1.5	.25	4.15	2.75	1.65	2.25	−1.1	13.6	6.0	2.7	1.9
19	3.5	1.45	.2	3.45	2.65	1.45	1.9	−1.1	13.7	5.75	2.6	1.9
20	3.4	1.4	.2	3.2	2.6	1.25	1.65	−1.1	13.9	5.65	2.6	1.9
21	3.3	1.35	.2	3.05	2.5	.85	1.35	−1.2	14.0	5.4	2.55	1.95
22	3.15	1.3	.2	2.7	5.2	.55	1.2	−1.2	14.1	5.15	2.45	2.0
23	3.0	1.2	.2	2.45	6.1	.45	1.4	−1.2	14.2	4.95	2.35	2.1
24	3.0	1.15	.2	2.25	6.6	.35	1.35	−1.3	14.3	4.85	2.2	2.1
25	3.0	1.1	.85	2.0	6.7	.3	1.25	−1.3	13.5	4.75	2.2	2.1
26	3.05	1.1	1.95	1.65	6.6	.25	1.05	−1.3	12.15	4.65	2.35	2.1
27	3.1	1.1	2.8	1.3	6.15	.2	.75	−1.3	10.95	4.45	2.5	2.1
28	3.0	1.1	2.6	1.2	5.4	.4	.6	−1.3	10.15	4.25	2.4	2.0
29	2.85	.....	2.6	1.1	4.6	1.75	.5	−1.3	9.7	4.1	2.3	1.75
30	2.7	.....	1.5	1.1	3.95	3.15	.35	−1.25	9.7	4.2	2.2	1.6
31	2.6	.....	1.5	.....	3.85	.....	.2	− .8	.....	4.3	.....	1.5

CLEAR CREEK BASIN.

CLEAR CREEK NEAR CREEDE, COLO.

Clear Creek rises in the southeastern part of Hinsdale County, Colo., and flows in a general southeasterly direction to its junction with the Rio Grande in Mineral County. The creek is about 20 miles long.

The gaging station, which is located near the mouth of the creek, at the highway bridge at Texas Club House, about 20 miles above Creede, was established August 12, 1910, by the State engineer, and is maintained by the State.

The gage is a vertical staff bolted to the bridge abutment.

Measurements are made from the bridge or by wading above bridge. The measuring section at the gage is poor, but the wading section above is good.

The bed of stream is composed of gravel and small bowlders, and is not liable to shift. The record at this station gives the entire flow contributed by Clear Creek to the Rio Grande.

Discharge measurements of Clear Creek near Creede, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 12	Christiansen and Grieve	29.5	45.3	2.20	58
Sept. 12	I. G. Ferguson	34.8	38.4	2.06	38

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of Clear Creek near Creede, Colo., for 1910.

[Esther Workman observer.]

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1	.....	2.1	2.05	11	.....	2.05	2.05	21	2.15	2.1	.....
2	.....	2.1	2.05	12	2.2	2.05	2.05	22	2.1	2.1	.....
3	.....	2.1	2.05	13	2.2	2.05	2.05	23	2.15	2.1	.....
4	.....	2.1	2.05	14	2.2	2.1	2.05	24	2.15	2.1	.....
5	.....	2.1	2.05	15	2.1	2.1	2.05	25	2.1	2.05	.....
6	.....	2.05	2.05	16	2.1	2.1	2.1	26	2.1	2.05	.....
7	.....	2.05	2.05	17	2.1	2.1	.....	27	2.1	2.05	.....
8	.....	2.05	2.05	18	2.1	2.1	.....	28	2.1	2.05	.....
9	.....	2.05	2.05	19	2.1	2.1	.....	29	2.1	2.05	.....
10	.....	2.05	2.05	20	2.1	2.1	.....	30	2.1	2.05	.....
								31	2.1	.....	.....

Daily discharge, in second-feet, of Clear Creek near Creede, Colo., for 1910.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1	.....	46	40	11	.....	40	40	21	52	46	.....
2	.....	46	40	12	58	40	40	22	46	46	.....
3	.....	46	40	13	58	40	40	23	52	46	.....
4	.....	46	40	14	58	46	40	24	52	46	.....
5	.....	46	40	15	46	46	40	25	46	40	.....
6	.....	40	40	16	46	46	46	26	46	40	.....
7	.....	40	40	17	46	46	.....	27	46	40	.....
8	.....	40	40	18	46	46	.....	28	46	40	.....
9	.....	40	40	19	46	46	.....	29	46	40	.....
10	.....	40	40	20	46	46	.....	30	46	40	.....
								31	46	.....	.....

Monthly discharge of Clear Creek near Creede, Colo., for 1910.

[Drainage area, 139 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
Aug. 12–31	58	46	48.7	0.350	0.26	1,930
September	46	40	43.2	.311	.35	2,570
Oct. 1–16	46	40	40.4	.291	.17	1,280

SOUTH FORK OF RIO GRANDE.

SOUTH FORK OF RIO GRANDE AT SOUTH FORK, COLO.

The South Fork of the Rio Grande, a stream about 15 miles long, rises near Summitville, in Rio Grande County, and flows northward to its junction with the main stream at South Fork.

The gaging station, which is located at highway bridge half a mile west of South Fork, was established by the United States Geological Survey May 17, 1909, as a temporary station, a reference mark being put on lower chord of bridge. It was reestablished by the State engineer August 9, 1910, since which time a record of gage heights has been kept.

A slope gage is bolted to downstream side of right abutment of highway bridge.

Measurements are made from bridge or by wading above the bridge. The measuring section at bridge is poor, but the wading section above is good.

The bed of the stream is of gravel, cobbles, and bowlders, and is not liable to shift.

Discharge measurements of South Fork of Rio Grande at South Fork, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 1	G. H. Russell	.....	59	1.43	87
9	Grieve and Christiansen	38	98	1.42	71
Sept. 22	I. G. Ferguson	44	65	1.33	50
Oct. 18	E. O. Christiansen	31	44	1.40	67

NOTE.—Measurement of Aug. 9 made from the bridge; the other measurements were made by wading at various sections.

Daily gage height, in feet, of South Fork of Rio Grande at South Fork, Colo., for 1910.

[Lelia Singles, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1	.....	1.3	1.2	1.35	16	1.4	1.3	1.4	1.3
2	.....	1.3	1.25	1.25	17	1.4	1.2	1.6	1.25
3	.....	1.3	1.4	1.3	18	1.4	1.2	1.4	1.35
4	.....	1.3	1.3	1.3	19	1.4	1.3	1.35	1.35
5	.....	1.3	1.2	1.3	20	1.45	1.3	1.4	1.3
6	.....	1.3	1.2	1.3	21	1.4	1.2	1.4	1.3
7	.....	1.3	1.2	1.25	22	1.5	1.3	1.5	1.4
8	.....	1.25	1.2	1.3	23	1.45	1.2	1.35	1.2
9	1.45	1.2	1.2	1.2	24	1.45	1.2	1.4	1.3
10	1.5	1.2	1.2	1.2	25	1.5	1.2	1.5	1.35
11	1.5	1.2	1.2	1.2	26	1.35	1.2	1.75	1.45
12	1.75	1.2	1.2	1.2	27	1.35	1.2	1.4	1.35
13	1.55	1.25	1.2	1.25	28	1.3	1.2	1.3	1.3
14	1.6	1.2	1.2	1.2	29	1.3	1.15	1.3	1.35
15	1.5	1.2	1.25	1.2	30	1.3	1.15	1.3	1.35
					31	1.3	.....	1.35	.....

Daily discharge, in second-feet, of South Fork of Rio Grande at South Fork, Colo., for 1910.

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1	.....	50	35	60	16	70	50	70	50
2	.....	50	42	42	17	70	35	120	42
3	.....	50	70	50	18	70	35	70	60
4	.....	50	50	50	19	70	50	60	60
5	.....	50	35	50	20	80	50	70	50
6	.....	50	35	50	21	70	35	70	50
7	.....	50	35	42	22	90	50	90	70
8	.....	42	35	50	23	80	35	60	35
9	80	35	35	35	24	80	35	70	50
10	90	35	35	35	25	90	35	90	60
11	90	35	35	35	26	60	35	170	80
12	170	35	35	35	27	60	35	70	60
13	105	42	35	42	28	50	35	50	50
14	120	35	35	35	29	50	30	50	60
15	90	35	42	35	30	50	30	50	60
					31	50	.....	60	.....

Monthly discharge of South Fork of Rio Grande near South Fork, Colo., for 1910.

[Drainage area, 216 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
Aug. 9–31	170	50	79.8	0.369	0.32	3,640
September	50	30	40.6	.188	.21	2,420
October	170	35	58.4	.270	.31	3,590
November	80	35	49.4	.229	.26	2,940

CONEJOS RIVER BASIN.

CONEJOS RIVER NEAR MOGOTE, COLO.

Conejos River, the most important tributary of the Rio Grande in Colorado, rises on the eastern slope of the San Juan Range, which forms the western boundary of Conejos County. It first flows southeastward, but at the town of Conejos bends northeastward and enters the Rio Grande below the mouth of Trinchera Creek.

The gaging station, which was established March 21, 1907, replacing the station formerly maintained about 4 miles below, is located at a private highway bridge on Jacob's ranch, about 16 miles above Antonito, Colo., in T. 33 N., R. 6 E., New Mexico principal meridian. It is above every important diversion for irrigation and below all the principal tributaries except the San Antonio.

The datum of the chain gage, which is on the bridge, has not been changed since the station was established. This gage is at the same datum as the rod gage used by Antoine Jacob during 1905 and 1906. The gage heights for these years have been furnished to the United States Geological Survey by him from his private records. Discharge measurements are made from the highway bridge.

The data obtained at this station show the amount of water available for irrigation.

Water taken from the Conejos by numerous ditches below the station is used to irrigate 70,000 to 80,000 acres of land. The basin above the station affords excellent opportunities for storage, none of which are utilized at the present time. It will be difficult to obtain additional water rights for irrigation along this stream.

The river is covered with ice for three or four months during the winter season. The stream bed is strewn with cobblestones and bowlders, and the water has a comparatively high velocity at all stages, making conditions unfavorable for accurate measurement. Eddies around the crib piers of the bridge also introduce uncertainty in the results.

Discharge measurements of Conejos River near Mogote, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 26 [a]	J. B. Stewart	23	37	.....	46
Feb. 24 [b]	G. H. Russell	30	32	.....	53
Apr. 10	J. B. Stewart	96	169	1.20	304
May 27	G. H. Russell	104	258	2.25	1,110
June 25	do	96	176	1.30	352
Aug. 5	do	86	152	1.20	344
18	E. O. Christiansen	72	83	.63	140
Sept. 9	do	49	45	.30	71
23	do	52	40	.32	63
Oct. 22 [c]	Hezmalhalch and Christiansen	52	44	.42	72
Dec. 12 [c]	G. H. Russell	45	43	.28	65

[a] Ice. Measured by wading near Mogote. [b] Measured 2 miles above Mogote. [c] Ice. Measured by wading.

Daily gage height, in feet, of Conejos River near Mogote, Colo., for 1910.

[Francisque Jacob, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.5	0.4	0.45	0.95	2.35	2.7	1.1	0.85	0.5	0.2	0.4	0.3
2	.5	.4	.45	.95	2.1	2.7	1.1	.8	.5	.2	.4	.3
3	.5	.4	.45	.95	2.1	2.65	1.0	.75	.4	.2	.4	.3
4	.4	.4	.45	.95	2.2	2.6	1.0	.7	.4	.2	.4	.3
5	.5	.4	.5	.95	2.3	2.5	1.0	1.15	.4	.2	.4	.3
6	.5	.4	.5	1.05	2.2	2.3	1.0	1.05	.4	.2	.35	.3
7	.5	.4	.5	1.05	2.15	2.2	.95	.8	.35	.2	.4	.3
8	.5	.4	.5	1.15	2.4	2.1	.9	.8	.3	.2	.3	.3
9	.4	.4	.5	1.15	2.5	2.05	.85	.8	.3	.2	.3	.3
10	.4	.4	.5	1.15	2.65	1.95	.8	.9	.3	.2	.3	.3
11	.4	.4	.5	1.15	2.8	1.9	.8	1.15	.3	.2	.3	.3
12	.4	.4	.55	1.3	2.9	1.95	.8	1.15	.3	.2	.3	.3
13	.5	.4	.6	1.3	2.8	1.85	.8	1.05	.3	.2	.3	.3
14	.5	.4	.65	1.2	2.8	1.75	.8	1.0	.3	.2	.3	.3
15	.5	.4	.75	1.15	2.6	1.75	.8	.85	.3	.2	.3	.3
16	.5	4	.8	1.25	2.35	1.7	.75	.8	.3	.3	.3	.3
17	.5	.4	.85	1.25	2.3	1.65	.7	.7	.3	.4	.25	.3
18	.5	.4	.85	1.25	2.35	1.6	.7	.7	.3	.4	.2	.3
19	.5	.4	.85	1.3	2.15	1.5	.7	.7	.3	.5	.2	.3
20	.5	.4	.95	1.3	2.15	1.45	.6	.7	.3	.5	.2	.3
21	.5	.4	1.15	1.45	2.1	1.45	.6	.6	.3	.45	.2	.3
22	.5	.4	1.15	1.45	2.05	1.45	.8	.6	.35	.3	.2	.3
23	.5	.4	1.3	1.45	1.9	1.45	.75	.75	.3	.3	.2	.3
24	.5	.4	1.2	1.8	1.85	1.25	.7	.65	.3	.4	.2	.3
25	.5	.4	1.25	2.15	1.9	1.3	.7	.6	.3	.45	.2	.3
26	.5	.4	1.15	2.3	2.0	1.3	.65	.55	.3	.45	.2	.3
27	.5	.4	1.0	2.3	2.2	1.25	.6	.5	.3	.5	.25	.3
28	.5	.4	1.05	2.45	2.55	1.2	.65	.5	.25	.45	.3	.3
29	.5	.....	1.05	2.5	2.7	1.2	.6	.5	.2	.4	.3	.3
30	.4	.....	1.0	2.45	2.85	1.2	.65	.55	.2	.4	.3	.3
31	.4	.....	.95	.....	2.75	.....	.95	.5	.....	.4	.....	.3

NOTE.—Affected by ice Jan. 1 to Mar. 8. There was some thin ice during October, November, and December, which probably did not materially affect the gage heights.

Daily discharge, in second-feet, of Conejos River near Mogote, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	75	.....	50	222	1,180	1,630	278	190	95	47	75	60
2	75	.....	50	222	910	1,630	278	175	95	47	75	60
3	75	.....	50	222	910	1,560	240	161	75	47	75	60
4	75	.....	50	222	1,010	1,490	240	147	75	47	75	60
5	75	.....	50	222	1,120	1,360	240	298	75	47	75	60
6	75	.....	50	259	1,010	1,120	240	259	75	47	68	60
7	75	.....	50	259	960	1,010	222	175	68	47	75	60
8	75	.....	50	298	1,240	910	205	175	60	47	60	60
9	75	.....	75	298	1,360	865	190	175	60	47	60	60
10	75	.....	75	298	1,560	780	175	205	60	47	60	60
11	60	.....	75	298	1,770	740	175	298	60	47	60	60
12	60	.....	108	363	1,920	780	175	298	60	47	60	60
13	60	.....	120	363	1,770	701	175	259	60	47	60	60
14	60	.....	134	319	1,770	627	175	240	60	47	60	60
15	60	.....	161	298	1,490	627	175	190	60	47	60	60
16	50	.....	175	341	1,180	592	161	175	60	60	60	60
17	50	.....	190	341	1,120	560	147	147	60	75	54	60
18	50	.....	190	341	1,180	528	147	147	60	75	47	60
19	50	.....	190	363	960	468	147	147	60	95	47	60
20	50	.....	222	363	960	440	120	147	60	95	47	60
21	45	.....	298	440	910	440	120	120	60	85	47	60
22	45	.....	298	440	865	440	175	120	68	60	47	60
23	45	.....	363	440	740	440	161	161	60	60	47	60
24	45	.....	319	662	701	341	147	134	60	75	47	60
25	46	.....	341	960	740	363	147	120	60	85	47	60
26	45	.....	298	1,120	820	363	134	108	60	85	47	60
27	45	.....	240	1,120	1,010	341	120	95	60	95	54	60
28	45	.....	259	1,300	1,420	319	134	95	54	85	60	60
29	45	.....	259	1,360	1,630	319	120	95	47	75	60	60
30	45	.....	240	1,300	1,840	319	134	108	47	75	60	60
31	45	.....	222	.....	1,700	.....	222	95	.....	75	.....	60

NOTE.—These discharges are based on a rating curve that is fairly well defined below 2,100 second-feet.

Monthly discharge of Conejos River near Mogote, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	58.0	3,570	D.
February	.....	.....	50.0	2,780	D.
March	.....	.....	169	10,400	C.
April	1,360	222	502	29,900	A.
May	1,920	701	1,220	75,000	A.
June	1,630	319	737	43,900	A.
July	278	120	178	10,900	A.
August	298	95	171	10,500	A.
September	95	47	63.8	3,800	B.
October	95	47	63.2	3,890	B.
November	75	47	59.0	3,510	B.
December	60	60	60.0	3,690	C.
The year	1,920	.....	275	203,000	

NOTE.—Discharge Jan. 1–Mar. 8 estimated on account of ice.

SAN LUIS CREEK BASIN.

DESCRIPTION.

San Luis Creek rises in Poncha Pass, at the north end of the San Luis Valley, Colo., and flows southward through Homan Park, but it is soon lost in the sands and gravels of the plain below, except during the rainy season. The surface configuration of the valley

is such that this creek should receive all the water entering on either side north of the Rio Grande, but as a matter of fact most of the drainage is lost by seepage before it reaches the creek, or reaches it only in flood season. The creek itself in its lower course develops a series of wet-weather ponds and finally flows into the San Luis Lakes. The old overflow drainage course to the Rio Grande still exists, but has been so blocked and concealed by incipient sand dunes as to be very difficult to trace except in its general features.[1]

SAN LUIS CREEK NEAR VILLA GROVE, COLO., 1910.

This station, which was established by the State engineer September 8, 1910, and is maintained by the State, is located at Jay White's ranch near Villa Grove. Very little water passes this station at most times during the year.

The gage is a vertical staff bolted to the abutment of highway bridge at White's ranch.

Measurements are made from the bridge or by wading at gauge. The measurement section is fair.

The bed of stream consists of mud, sand, and some small bowlders. The banks are low and liable to overflow at high water. The channel is not liable to shift.

Discharge measurements of San Luis Creek near Villa Grove, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 8	I. C. Ferguson	7.0	2.2	0.20	0.9
Oct. 7	E. O. Christiansen	8.6	2.6	.30	2.2

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of San Luis Creek near Villa Grove, Colo., for 1910.

[Jay White, observer.]

Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.
1		0.3	0.2	16	0.3	0.4	0.3
2		.3	.2	17	.3	.4	.3
3		.3	.2	18	.4	.35	.3
4		.3	.2	19	.3	.3	.3
5		.3	.2	20	.3	.3	.3
6		.3	.2	21	.4	.25	.3
7		.3	.2	22	.3	.3	.3
8	0.2	.3	.2	23	.3	.3	.3
9	.2	.3	.2	24	.3	.3	.3
10	.25	.3	.2	25	.3	.3	.3
11	.3	.3	.2	26	.3	.3	.3
12	.3	.3	.2	27	.3	.3	.3
13	.3	.3	.2	28	.3	.3	.3
14	.3	.3	.2	29	.3	.25	.3
15	.3	.3	.3	30	.3	.2	.25
				31		.2	

[1] Siebenthal, C. E., Geology and water resources of the San Luis Valley, Colo.: Water-Supply Paper U. S. Geol. Survey No. 240, 1910, p. 12.

Daily discharge, in second-feet, of San Luis Creek near Villa Grove, Colo., for 1910.

Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.
1	.....	2.2	0.9	16	2.2	4	2.2
2	.....	2.2	.9	17	2.2	4	2.2
3	.....	2.2	.9	18	4	3.1	2.2
4	.....	2.2	.9	19	2.2	2.2	2.2
5	.....	2.2	.9	20	2.2	2.2	2.2
6	.....	2.2	.9	21	4	1.6	2.2
7	.....	2.2	.9	22	2.2	2.2	2.2
8	0.9	2.2	.9	23	2.2	2.2	2.2
9	.9	2.2	.9	24	2.2	2.2	2.2
10	1.6	2.2	.9	25	2.2	2.2	2.2
11	2.2	2.2	.9	26	2.2	2.2	2.2
12	2.2	2.2	.9	27	2.2	2.2	2.2
13	2.2	2.2	.9	28	2.2	2.2	2.2
14	2.2	2.2	.9	29	2.2	1.6	2.2
15	2.2	2.2	2.2	30	2.2	.9	1.6
				31	.....	.9	.....

Monthly discharge of San Luis Creek near Villa Grove, Colo., for 1910.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
Sept. 8–30	4	0.9	2.22	0.010	0.01	101
October	4	.9	2.22	.010	.01	137
November	2.2	.9	1.57	.0072	.01	94

SAGUACHE RIVER NEAR SAGUACHE, COLO.

Saguache River rises among the peaks of the Continental Divide in the western part of Saguache County, Colo., flows northeasterly about 25 miles, then turns and flows southeastward into San Luis Park. In times of flood its waters may reach San Luis Creek but all the normal and high-water flow is taken by irrigation canals.

A gaging station was established in 1910 by the Stark-Hagadorn Irrigation Co. at a dam site 9 miles above Saguache. Practically no flow is contributed to Saguache River below this station. Some irrigation is carried on above the station.

Two gages are used—a Bristol automatic and a vertical staff gage set in the automatic gage well. Both gages are at the same datum, which has not changed during the year.

Measurements are made from a foot log or by wading at the gauge. The section is good. The bed of the stream consists of sand and gravel, with a few small cobbles, and is not liable to shift.

The following record was furnished by the State engineer of Colorado through the courtesy of the Stark-Hagadorn Irrigation Co.:

Discharge measurements of Saguache River near Saguache, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 3	I. C. Ferguson	24	26.8	1.10	50
Oct. 6	E. O. Christiansen	22	23	.92	36

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of Saguache River near Saguache, Colo., for 1910.

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1	.....	1.1	1.0	0.95	16	1.1	1.05	0.95	.....
2	.....	1.1	1.0	.95	17	1.1	1.0	1.0	.....
3	.....	1.05	1.0	.95	18	1.1	1.0	1.15	.....
4	.....	1.05	1.0	.95	19	1.1	1.0	1.1	.....
5	.....	1.05	1.0	1.0	20	1.1	1.0	1.1	.....
6	.....	1.05	1.0	.....	21	1.1	1.0	1.1	.....
7	1.15	1.0	1.0	.....	22	1.1	1.0	.9	.....
8	1.15	.95	1.0	.....	23	1.15	1.1	.95	.....
9	1.15	.95	1.0	.....	24	1.15	1.05	1.05	.....
10	1.25	.95	1.0	.....	25	1.1	1.0	1.05	.....
11	1.2	.95	.9	.....	26	1.05	1.0	1.05	.....
12	1.2	1.0	.9	.....	27	1.0	1.0	1.0	.....
13	1.2	1.1	1.0	.....	28	1.0	1.0	.95	.....
14	1.15	1.1	1.0	.....	29	1.1	1.0	.95	.....
15	1.1	1.05	.95	.....	30	1.1	1.0	.95	.....
					31	1.1	.....	.95	.....

Daily discharge, in second-feet, of Saguache River near Saguache, Colo., for 1910.

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1	.....	50	42	38	16	50	46	38	.....
2	.....	50	42	38	17	50	42	42	.....
3	.....	46	42	38	18	50	42	54	.....
4	.....	46	42	38	19	50	42	50	.....
5	.....	46	42	42	20	50	42	50	.....
6	.....	46	42	.....	21	50	42	50	.....
7	54	42	42	.....	22	50	42	34	.....
8	54	38	42	.....	23	54	50	38	.....
9	54	38	42	.....	24	54	46	46	.....
10	62	38	42	.....	25	50	42	46	.....
11	58	38	34	.....	26	46	42	46	.....
12	58	42	34	.....	27	42	42	42	.....
13	58	50	42	.....	28	42	42	38	.....
14	54	50	42	.....	29	50	42	38	.....
15	50	46	38	.....	30	50	42	38	.....
					31	50	.....	38	.....

Monthly discharge of Saguache River near Saguache, Colo., for 1910.

[Drainage area, 595 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
Aug. 7–31	62	42	51.6	0.087	0.08	2,560
September	50	38	43.7	.071	.08	2,600
October	50	34	41.9	.070	.08	2,570

CULEBRA RIVER BASIN.

CULEBRA RIVER AT SAN LUIS, COLO.

Culebra River rises on the western slope of the Culebra Range in the southern part of Costilla County, Colo., flows northward along the base of the range to San Luis, then turns and flows westward to its junction with the Rio Grande.

The gaging station, which is located at the county bridge in the town of San Luis, has been maintained by the Costilla Estates Development Co.

The following discharge estimates have been furnished by the State engineer through the courtesy of the development company:

Daily discharge, in second-feet, of Culebra River at San Luis, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	57									35		
2				95			52					
3									34			
4						185						
5		36	84								33	
6								53				
7					203							
8	40									34		
9				95			24					
10									39			
11						63						
12		37	98								40	
13								58				
14					255							
15	34									35		
16				136			15					
17									37			
18						58						
19		37	89								36	
20								25				
21					212							
22	34									40		
23				185			18					
24									31			
25						59						
26		37	107								32	
27								30				
28					165							
29	37									33		
30				255			30					
31												

NOTE.—Discharges are averages for week beginning on dates opposite discharges noted. Discharge for week beginning Sept. 3, estimated.

Monthly discharge of Culebra River at San Luis, Colo., for 1910.

[Drainage area, 260 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	41	0.158	0.18	2,521
February	37	.142	.15	2,055
March	87	.335	.39	5,349
April	136	.523	.58	8,093
May	222	.854	.98	13,650
June	100	.385	.43	5,950
July	28	.108	.12	1,722
August	40	.154	.18	2,460
September	35	.135	.15	2,083
October	37	.142	.16	2,275
November	35	.135	.15	2,083
The period				48,200

RIO COLORADO BASIN.

DESCRIPTION.

Rio Colorado[1] (or Red River) rises in the eastern part of Taos County, N. Mex., on the western slope of Red River Peak, and flows in a general westerly course to its junction with the Rio Grande 1 mile west of Cebollas. It is about 25 miles long.

RIO COLORADO ABOVE QUESTA, N. MEX.

This station was established October 14, 1910, about 3 miles above Questa, and about the same distance above the mouth of Cabresto Creek. It is about 300 feet below the engineers' camp of the Red River Land & Water Co.

A rod gage was installed. About March, 1910, a gage was established by one of Field, Fellows & Hinderlider's engineers at a point near the camp. The gage heights following are referred to this gage. On October 14 a new rod gage was established at a point 5 miles above Questa.

Discharge measurements of Rio Colorado above Questa, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 14[a]	J. B. Stewart	21.5	10.2	0.61	20.4
Dec. 14[b]	Russell and Digby	18	10.2	.6	15.5

[a] Measurement made 3 miles above Questa. Gage height is referred to gage established this date.
[b] Measurement made 5 miles above Questa.

[1] Called "Colorado Creek" in Twelfth Ann. Rept. U. S. Geol. Survey, pp. 251-252.

Daily gage height, in feet, of Rio Colorado above Questa, N. Mex., for 1910.

Day.	Apr.	July.	Aug.	Sept.	Oct.	Day.	Apr.	July.	Aug.	Sept.	Oct.
1	.....	.....	0.66	0.66	0.49	16	1.1	.....	0.66	0.56	.....
2	.....	.....	.66	.61	.49	17	1.15	.....	.61	.51	.....
3	.....	.....	.71	.61	.49	18	1.15	.....	.61	.46	.....
4	.....	.....	.71	.61	.49	19	1.2	.....	86	.51	.....
5	0.95	.....	1.26	.56	.49	20	1.2	.....	.76	.53	.....
6	.95	.....	.96	.56	.49	21	1.25	.....	76	.51	.....
7	1.0	.....	.66	.53	.49	22	1.25	.....	.76	.61	.....
8	1.0	.....	.66	.51	.49	23	1.35	.....	1.16	.52	.....
9	1.0	.....	.66	.51	.48	24	1.45	.....	1.06	.49	.....
10	1.0	.....	.66	.53	.48	25	1.65	.....	.96	.51	.....
11	1.0	.....	.66	.51	.48	26	1.7	.....	.76	.50	.....
12	1.05	.....	.76	.51	.48	27	1.85	.....	.71	.49	.....
13	1.25	.....	.71	.51	.48	28	1.9	0.56	.66	.48	.....
14	1.2	.....	.71	.51	.48	29	.....	.56	.61	.49	.....
15	1.1	.....	.66	.51	.....	30	.....	.66	.61	.49	.....
						31	.....	.66	.66	.....	.....

NOTE.—Gage heights are referred to datum of gage established in March by one of Field, Fellows & Hinderlider's engineers.

RIO COLORADO BELOW QUESTA, N. MEX.

This station, which was established April 8, 1910, is located about 2 miles below Questa, and below the mouth of the Cabresto Creek. It is at head of Lower Canyon, 5 miles above the mouth, and is below all diversions and tributaries of any importance. Gage readings are from vertical rod gage located on right bank 50 yards upstream from Virgil's gristmill.

Discharge measurements of Rio Colorado below Questa, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 8	J. B. Stewart	28.5	25	1.52	80
July 13	.....do	18.5	19.7	1.48	45.6
Sept. 12	C. D. Miller	24	14.5	1.17	26.5
Oct. 14	J. B. Stewart	17.5	13.8	1.18	25.2
Dec. 14	C. B. Digby	23	21.4	1.14	25.8

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rio Colorado below Questa, N. Mex., for 1910.

[J. G. Vigil and Narcico Vigil, observers.]

Day	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
1	.....	2.4	1.9	1.4	.....	1.1	1.1
2	.....	2.3	1.9	1.3	.....	1.1	1.1
3	.....	2.3	1.9	1.35	.....	1.1	1.1
4	.....	2.3	2.0	1.3	.....	1.1	1.1
5	.....	2.3	1.9	1.3	.....	1.1	1.1
6	.....	2.25	1.9	1.3	.....	1.1	1.1
7	.....	2.2	1.9	1.25	.....	1.1	1.05
8	1.5	2.2	1.8	1.2	.....	1.1	1.05
9	1.55	2.3	1.8	1.2	.....	1.1	1.05
10	1.5	2.3	1.7	.....	.....	1.1	1.05
11	1.6	2.3	1.7	.....	.....	1.1	1.1
12	1.6	2.3	1.7	.....	.....	1.1	1.1
13	1.7	2.45	1.6	.....	.....	1.1	1.1
14	1.6	2.45	1.6	.....	1.2	1.1	1.1
15	1.6	2.35	1.55	.....	1.2	1.1	1.0
16	1.6	2.25	1.7	.....	1.2	1.1	1.05
17	1.6	2.2	1.6	.....	1.2	1.1	1.0
18	1.65	2.15	1.55	.....	1.2	1.1	1.0
19	1.65	2.1	1.5	.....	1.2	1.1	1.0
20	1.7	2.0	1.5	.....	1.1	1.1	1.0
21	1.85	1.9	1.5	.....	1.1	1.1	1.0
22	1.8	1.95	1.45	.....	1.1	1.1	1.0
23	1.9	1.9	1.4	.....	1.2	1.1	1.0
24	2.0	1.75	1.4	.....	1.2	1.1	1.0
25	2.3	1.7	1.4	.....	1.2	1.1	1.05
26	2.4	1.65	1.45	.....	1.15	1.1	1.1
27	2.35	1.8	1.5	.....	1.1	1.1	1.05
28	2.45	1.75	1.5	.....	1.1	1.1	1.05
29	2.55	1.9	1.4	.....	1.1	1.1	1.05
30	2.5	1.9	1.4	.....	1.1	1.1	1.05
31	.....	2.0	.....	.....	1.1	.....	1.0

ARROYO HONDO BASIN.

ARROYO HONDO NEAR ARROYO HONDO, N. MEX.

Arroyo Hondo arises in the eastern part of Taos County, N. Mex., and flows southeastward to its junction with the Rio Grande. The valley through which it flows is from one-half to three-fourths of a mile wide for about 4 miles, then alternately contracts and opens at short intervals. Through the greater part of the stream's course the valley lies fully 500 feet below the level of the surrounding country.

The gaging station was established April 8, 1910, at the highway bridge at John Dunn's ranch 200 yards above the mouth of the stream and below all tributaries and diversions. It is 15 miles from Servilleta, the nearest railroad point, and 14 miles from Taos. A slope rod gage is fastened to left bridge abutment. Gage readings are taken gratis by John Dunn.

Discharge measurements of Arroyo Hondo near Arroyo Hondo, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 6	W. B. Freeman	23.8	12.5	1.85	31.4
July 12	J. B. Stewart	11.0	3.5	1.55	5.2
Oct. 15	....do	10.5	4.3	1.65	10.1
Dec. 16	Russell and Digby	6.8	3.3	1.80	5.4

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Arroyo Hondo near Arroyo Hondo, N. Mex., for 1910.

[John Dunn, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1	.....	2.8	2.65	1.5	1.5	16	2.1	2.75	2.2	1.5	1.1
2	.....	2.6	2.6	1.5	2.5	17	1.95	2.7	2.2	1.5	1.5
3	.....	2.5	2.6	1.5	2.6	18	2.0	2.65	2.15	1.5	1.5
4	.....	2.5	2.55	1.5	2.5	19	2.15	2.6	2.2	1.5	1.5
5	.....	2.5	2.5	1.5	2.5	20	2.3	2.6	2.2	1.5	1.5
6	1.85	2.5	2.5	1.45	2.5	21	2.3	2.55	2.2	1.5	1.5
7	.....	2.6	2.55	1.45	2.5	22	2.2	2.5	2.2	1.5	.....
8	1.85	2.55	2.5	1.5	2.0	23	2.25	2.55	2.15	1.5	.....
9	.....	2.55	2.4	1.5	2.0	24	2.2	2.5	2.15	1.5	.....
10	.....	2.55	2.3	1.95	2.0	25	2.4	2.5	2.1	1.5	.....
11	1.9	2.6	2.2	1.8	2.0	26	2.5	2.5	2.1	1.5	.....
12	2.0	2.7	2.2	1.55	2.0	27	2.4	2.5	2.0	1.5	.....
13	1.9	2.7	2.2	1.55	2.0	28	2.7	2.45	2.0	2.5	.....
14	1.95	2.8	2.2	1.5	1.1	29	2.7	2.5	2.0	3.0	.....
15	2.0	2.8	2.2	1.5	1.1	30	2.75	2.55	2.0	2.5	.....
						31	.....	2.5	.....	.....	.....

RIO TAOS BASIN.

DESCRIPTION.

Rio Taos is formed by three principal streams—Rio Pueblo de Taos, Rio Fernando de Taos, and Rio Grande del Rancho.

Rio Pueblo de Taos enters Taos Valley on the north, a short distance above the ancient Indian pueblo of Taos. Its principal tributaries are Rio Lucero and Arroyo Seco, but it receives only flood waters from these streams, their normal flow being used for irrigation.

Rio Fernando de Taos issues from a narrow canyon about 3½ miles above Taos. It furnishes water for three or four small ditches.

Rio Grande del Rancho, which lies farthest south, has one tributary—Rio Chiquita—which joins it 2 miles below the point where it enters the valley. During the irrigating season the stream carries little if any water.

Below Cordova the Rio Taos flows through a canyon to its junction with the Rio Grande.

The Taos Range to the east is well timbered with pine and spruce and contains valuable mineral deposits.

RIO PUEBLO DE TAOS NEAR TAOS, N. MEX.

A station was established April 7, 1910, about 2 miles upstream from the Indian pueblo of Taos and 200 yards upstream from the uppermost irrigation diversion. It is below all mountain tributaries.

A vertical rod gage was located on the left bank but was destroyed before July 12. A new gage was installed in the same position October 12, with datum 0.27 foot lower. No regular observer was employed and only occasional gage readings were obtained until December 19, when a Bristol automatic gage was installed at the datum of the second staff gage.

Discharge measurements of Rio Pueblo de Taos near Taos, N. Mex., in 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
Mar. 12	S. S. Carroll			27.7
Apr. 7	J. B. Stewart	18	1.50	43
July 12	....do	12		14
Sept. 15	C. D. Miller	8.9		7.2
Oct. 15	J. B. Stewart	8.8	.66	6.8
Dec. 19[a]	Digby and Russell	9.5	1.08	5.0

[a] Ice.

NOTE.—Gage heights refer to datum of gage established Apr. 7.

Daily gage height, in feet, of Rio Pueblo de Taos near Taos, N. Mex., for 1910.

[B. G. Phillips, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.
1		11		21	1.05
2		12		22	1.0
3		13		23	1.4
4		14		24	1.6
5		15		25	1.4
6		16		26	1.05
7		17		27	1.05
8		18		28	1.1
9		19	1.1	29	1.2
10		20	1.05	30	1.6
				31	

NOTE.—These gage heights were recorded by the automatic gage.

RIO PUEBLO DE TAOS AT LOS CORDOVAS, N. MEX.

This station was established April 6, 1910, about 100 feet downstream from the mouth of Rio Grande del Rancho and Arroyo Seco and about 1 mile below the mouth of Rio Lucero. It is just below A. J. Anderson's grist mill and a short distance northeast of Los Cordovas. The readings are taken from a vertical rod gage located on the right bank.

Discharge measurements of Rio Pueblo de Taos at Los Cordovas, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 6	J. B. Stewart	36.5	40	1.47	72
July 12	....do	10.5	6.4	.73	3.0
Sept. 15	C. D. Miller	13	6.0	.80	3.2
Oct. 16	J. B. Stewart	8.5	5.5	.85	6.0
Dec. 18[a]	Digby and Russell	24	25.6	1.17	24.4

[a] Ice.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rio Pueblo de Taos at Los Cordovas, N. Mex., for 1910.

[A. J. Anderson, observer.]

Day.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.5	1.4	0.7	0.75	0.8	0.8	1.0	1.0
2	.....	2.4	1.3	.7	.7	.8	.8	1.0	1.0
3	.....	2.3	1.3	.7	.7	.8	.9	1.0	1.0
4	.....	2.3	1.2	.7	.8	.8	.9	1.0	1.0
5	.....	2.25	1.2	.7	.8	.8	.85	1.0	1.1
6	1.45	2.2	1.1	.7	.8	.8	.8	1.0	1.1
7	1.5	2.2	1.05	.7	.8	.8	.85	1.0	1.1
8	1.55	2.15	.95	.7	.8	.8	.8	1.0	1.05
9	1.5	2.25	.9	.7	.7	.8	.85	1.0	1.1
10	1.5	2.1	.9	.8	.7	.8	.85	1.0	1.05
11	1.5	2.1	.8	.8	.75	.8	.9	1.0	1.1
12	1.5	2.1	.8	.75	.8	.75	.85	1.0	1.05
13	1.8	2.1	.8	.8	.8	.7	.85	1.0	1.05
14	1.9	2.1	.8	.8	.8	.8	.9	1.0	1.05
15	1.8	2.2	.8	.7	.7	.8	.85	1.0	1.1
16	1.75	2.05	.8	.7	.8	.8	.85	1.0	1.05
17	1.8	2.0	.8	.7	.8	.8	.9	1.0	1.1
18	1.85	1.9	.75	.7	.8	.8	.85	1.0	1.1
19	1.9	1.8	.75	.7	.8	.8	.9	1.0	1.1
20	2.0	1.7	.7	.7	.8	.8	.9	1.0	1.05
21	2.1	1.65	.7	.7	.8	.8	.9	1.0	1.1
22	2.15	1.7	.7	.7	.8	.8	.95	1.0	1.05
23	2.1	1.6	.7	.7	.8	.8	.95	1.0	1.1
24	2.1	1.5	.7	.7	.8	.8	1.0	1.0	1.1
25	2.15	1.4	.7	.7	.8	.8	.95	1.0	1.1
26	2.3	1.25	.8	.7	.8	.8	1.0	1.0	1.05
27	2.3	1.2	.8	.7	.8	.8	.95	1.0	1.05
28	2.4	1.15	.7	.7	.8	.8	1.0	1.0	1.05
29	2.5	1.2	.7	.7	.8	.8	.95	1.0	1.05
30	2.55	1.25	.7	.85	.8	.8	1.0	1.0	1.05
31	.....	1.35	.....	.8	.8	.....	1.0	.....	1.1

NOTE.—Slightly affected by ice Dec. 18-31.

RIO LUCERO NEAR TAOS, N. MEX.

This station was established April 7, 1910, in the mouth of the canyon 9 miles above Taos and about 1½ miles above Myer's ranch. It is about 200 yards upstream from the head gate of the Seco ditch, which is the uppermost diversion.

A vertical rod gage was established on the right bank. Only occasional readings were obtained, as there was no observer. On December 17 a Bristol automatic gage was installed at the same datum as the staff gage.

Discharge measurements of Rio Lucero near Taos, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 12	S. S. Carroll				11.4
Apr. 7	J. B. Stewart	12	10.2	1.05	21.2
July 12	do	12.6	13.8	.95	14.7
Sept. 15	C. D. Miller	12.5	12.7	.82	10
Oct. 15	J. B. Stewart	12.5	6.6	.80	8.4
Dec. 17[a]	Russell and Digby	17	14.0	1.19	10.7

[a] Ice.

Daily gage height, in feet, of Rio Lucero near Taos, N. Mex., for 1910.

[B. G. Phillips, observer.]

Day.	May.	June.	July.	Aug.	Dec.	Day.	May.	June.	July.	Aug.	Dec.
1						16	1.55				
2		1.5				17			0.9		1.1
3			1.05			18					.9
4						19					.7
5	1.5			1.0		20					.7
6						21					.7
7						22					.7
8						23					.7
9						24					.7
10						25					.7
11						26					.7
12						27					.7
13		1.35				28					.7
14			1.0			29	1.45				.7
15						30					.7
						31					.7

NOTE.—Gage heights affected by ice Dec. 17–31.

RIO FERNANDO DE TAOS NEAR TAOS, N. MEX.

This station was established April 6, 1910, at the mouth of the canyon almost 2 miles south of Taos and 200 yards upstream from the head gate of B. G. Randall's intake ditch, the highest diversion of any importance.

A vertical rod gage is located on the left bank. Observations were taken gratis by B. G. Randall.

Discharge measurements of Rio Fernando de Taos near Taos, N. Mex., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 6	J. B. Stewart	14.5	7	1.05	17.8
July 12	do	9	2.3	.70	2.2
Sept. 15	C. D. Miller	3.5	1.12	.7	.8
Oct. 15	J. B. Stewart	5.8	1.3	.75	1.0
Dec. 16	Russell and Digby			.68	[a].5

[a] Discharge estimated.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rio Fernando de Taos near Taos, N. Mex., for 1910.

[B. G. Randall, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.4	0.85	0.7	0.8	0.75	16	1.1	1.0	0.8	0.7	0.75	.....
2	.....	1.4	.85	.7	.8	.75	17	1.2	1.0	.8	.7	.75	.....
3	.....	1.4	.85	.7	.8	.75	18	1.2	1.0	.75	.7	.75	.....
4	.....	1.4	.8	.65	.8	.....	19	1.3	.95	.75	.65	.8	.....
5	.....	1.3	.95	.65	.8	.8	20	1.5	.95	.75	.65	.8	.....
6	1.05	1.3	.9	.65	.8	.75	21	1.5	.95	.75	.7	.8	.....
7	.....	1.3	.85	.65	.8	.75	22	1.3	.9	.75	.65	.75	.....
8	1.0	1.3	.85	.6	.8	.75	23	1.3	.9	.75	.7	.75	.....
9	1.05	1.3	.85	.6	.8	.75	24	1.4	.9	.7	.7	.75	.....
10	1.3	1.2	.8	.6	.8	.75	25	1.4	.9	.75	.75	.75	.....
11	1.3	1.15	.8	.7	.8	.75	26	1.5	.9	.75	.75	.75	.....
12	1.3	1.15	.8	.7	.8	.....	27	1.5	.9	.7	.85	.75	.....
13	1.5	1.05	.8	.85	.8	.....	28	1.5	.9	.75	.85	.75	.....
14	1.5	1.05	.8	.75	.75	.....	29	1.5	.85	.7	.8	.75	.....
15	1.3	1.05	.8	.7	.75	.....	30	1.6	.85	.7	1.5	.75	.....
							31	.....	.85	.....	.9	.75	.....

SANTA FE CREEK BASIN.

DESCRIPTION.

Santa Fe Creek rises on the range east of Santa Fe and flows westward over high plains to join the Rio Grande. In the mountains at the head of the creek are two small lakes which may be considered typical of those at the headwaters of other streams flowing toward the Rio Grande. The elevation of these lakes is about 11,000 feet. Between Santa Fe and Cieneguilla the stream runs through a valley with gradually sloping sides. At Cieneguilla it enters La Bajada Canyon, which is deep and narrow as far as the town of La Bajada; below this is a broader valley with a gentle slope to the left and the edge of the mesa to the right. This valley continues almost to the mouth of the creek.

SANTA FE CREEK AT MONUMENT ROCK, NEAR SANTA FE, N. MEX.

This station is located 7 miles above Santa Fe, at Monument Rock—a large, conspicuous bowlder near the creek. The gage was established August 27, 1910, by an engineering party temporarily in that vicinity. Several gage readings were taken daily and numerous discharge measurements made. The station is about 4 miles above that established May 12, 1910, near the Santa Fe Water & Light Co.'s ditch. No important tributaries enter between the stations.

Discharge measurements of Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 29	C. H. Neel	6.4	3.0	0.72	1.6
30	do	6.4	2.8	.71	1.3
Oct. 7	do	6.4	2.8	.69	1.1
10	do	6.4	2.7	.69	1.1
21	do	8.0	3.1	.73	1.6
26	do	8.0	3.0	.72	1.3
29	do	8.0	3.0	.71	1.3
Nov. 1	do	8.0	3.1	.71	1.47
9	do	7.2	2.9	.70	1.2
11	do	8.0	3.0	.71	1.49
19	do	8.0	3.0	.73	1.74
22	do	8.0	3.1	.71	1.4
28	T. E. Neel	8.0	3.1	.75	1.56
Dec. 1	do	7.6	2.3	.65	.69
6	do	8.0	2.8	.72	1.2
9	do	8.0	2.6	.70	1.08
14	do	8.0	2.8	.71	1.16
22	do	8.0	2.8	.71	1.16
23	do	8.0	2.6	.70	1.11

Daily gage height, in feet, of Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., for 1910.

[T. E. Neel, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.80	0.71	0.71	0.71	16		0.74	0.69	0.73	0.69
2		.80	.70	.71	.70	17		.74	.75	.71	.71
3		.78	.71	.71	.72	18		.75	.71	.72	.71
4		.76	.70	.71	.72	19		.82	.75	.75	.71
5		76	.70	.75	.65	20		.76	.74	.72	.71
6		.75	.70	.72	.71	21		.75	.69	.72	.70
7		.74	.70	.72	.72	22		.75	.73	.72	.72
8		.74	.69	.72	.71	23		.74	.72	.71	.71
9		.73	.69	.71	.70	24		.72	.72	.71	.72
10		.73	.69	.71	.70	25		.72	.72	.71	.72
11		.73	.70	.71	.71	26		.72	.72	.71	.71
12		.72	.70	.71	.70	27		.71	.72	.70	.70
13		.72	.70	.71	.70	28		.72	.71	.72	.72
14		.79	.69	.72	.71	29	0.86	.72	.71	.70	.70
15		.77	.69	.71	.71	30	.82	.71	.71	.71	.70
						31	.85		.71		

Daily discharge, in second-feet, of Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., for 1910.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.9	1.3	1.3	1.2	16		1.8	1.1	1.6	1.0
2		2.9	1.2	1.3	1.1	17		1.8	2.0	1.3	1.2
3		2.5	1.3	1.3	1.3	18		2.0	1.3	1.4	1.2
4		2.1	1.2	1.3	1.3	19		3.3	2.0	2.0	1.2
5		2.1	1.2	2.0	.7	20		2.1	1.8	1.4	1.2
6		2.0	1.2	1.4	1.2	21		2.0	1.1	1.4	1.1
7		1.8	1.2	1.4	1.3	22		2.0	1.6	1.4	1.3
8		1.8	1.1	1.4	1.2	23		1.8	1.4	1.3	1.2
9		1.6	1.1	1.3	1.1	24		1.4	1.4	1.3	1.3
10		1.6	1.1	1.3	1.1	25		1.4	1.4	1.3	1.3
11		1.6	1.2	1.3	1.2	26		1.4	1.4	1.2	1.2
12		1.4	1.2	1.3	1.1	27		1.3	1.4	1.1	1.1
13		1.4	1.2	1.3	1.1	28		1.4	1.3	1.3	1.3
14		2.7	1.1	1.4	1.2	29	4.3	1.4	1.3	1.1	1.1
15		2.3	1.1	1.3	1.2	30	3.3	1.3	1.3	1.2	1.1
						31	4.1		1.3		1.1

NOTE.—Daily discharge from two poorly defined rating curves based on discharge measurements made during the period.

Monthly discharge of Santa Fe Creek at Monument Rock, near Santa Fe, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
September	3.3	1.3	1.90	113	C.
October	2.0	1.1	1.32	81.2	C.
November	2.0	1.1	1.36	80.9	C.
December	1.3	.7	1.17	71.9	C.

SANTA FE CREEK NEAR SANTA FE, N. MEX.

This station, which was established May 31, 1907, to determine the amount of water available for irrigation and storage, is located at the Don Gaspar Avenue bridge in the city of Santa Fe.

The gage datum was changed on August 13, 1908, and again on August 22, 1908. Results obtained at this station have been very unsatisfactory owing to the torrential character of the stream, the shifting nature of the bed, and the inadequate number of discharge measurements.

Discharge measurements are made from the downstream side of the bridge.

No important tributaries except intermittent streams enter below the station. The drainage area at the station is about 40 square miles, and at the mouth of the river it is about 300 square miles.

The reservoir for the Santa Fe municipal supply is situated in the canyon above the station and a water-power plant of 100-horsepower capacity is used to develop power for lighting. Very little water is diverted for irrigation above the station. One small ditch takes water out just above. In the canyon 8 miles above Santa Fe is a reservoir site where 10,000 acre-feet can be stored.

Ice is usually to be found in the stream during the winter months, though the flow is very small during that period. The low-water flow is regulated to some extent by the waterworks reservoir above.

On May 12, 1910, the station was moved to a point 3½ miles above Santa Fe, about three-fourths of a mile above the Santa Fe Water & Light Co.'s reservoir and about 1,000 feet below the intake of the company's ditch. A vertical rod gage and a cable were installed.

Discharge measurements of Santa Fe Creek near Santa Fe, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	J. B. Stewart	13.5	8.9	1.0	16.3
July 17	C. D. Miller	.....	.....	.3	*a* .15
Aug. 21	J. B. Stewart	.....	.....	.35	*a* .4
Sept. 24	C. D. Miller	3.8	1.0	.39	1.1

a Discharge estimated.

NOTE.—Measurements made at station established May 12, 3½ miles above Santa Fe and below intake of Santa Fe Light & Water Co.'s ditch.

Daily gage height, in feet, of Santa Fe Creek near Santa Fe, N. Mex., for 1910.

[John Catanache, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	−0.1	−0.1	−0.1	.....	0.05	0.7	0.34
2	− .1	− .15	− .1	.....	.....	.67	.34
3	− .05	− .1	− .1	.....	.....	.65	.34
4	.1	− .1	− .1	.....	.....	.62	.34
5	.1	− .1	− .1	.....	.....	.58	.34
6	.1	− .1	− .1	.....	.....	.55	.43
7	.1	− .1	− .1	.....	.....	.49	.52
8	.1	− .1	− .1	.....	.....	.48	.52
9	.1	− .1	− .1	.....	.....	.45	.52
10	.1	− .1	− .1	.....	.....	.4	.52
11	.3	− .1	− .1	.....	.....	.4	.52
12	.3	− .1	− .1	.....	1.0	.4	.52
13	.3	− .1	− .1	.....	1.1	.4	.52
14	− .1	− .1	− .1	.....	1.05	.4	.54
15	− .05	− .1	− .1	.....	1.0	.35	.43
16	− .1	− .1	− .1	.....	.9	.34	.34
17	− .1	− .1	− .1	.....	.9	.34	.....
18	− .1	− .1	− .1	.....	.9	.34	.....
19	.0	− .1	− .1	.....	.85	.34	.....
20	.0	− .1	− .1	.....	.8	.34	.....
21	− .1	− .1	− .1	0.0	.....	.34	.....
22	− .1	− .1	− .1	.05	.75	.34	.....
23	− .1	− .1	− 1	.....	.7	.34	.....
24	− .1	− .1	− .1	.....	.69	.34	.....
25	− .1	− .1	− .1	.....	.68	.5	.....
26	− .1	− .1	− .1	.....	.67	.34	.....
27	− .1	− .1	− .1	.....	.67	.34	.....
28	− .1	− .1	− .1	.....	.67	.34	.....
29	− .1	.....	− .1	.....	.67	.34	.....
30	− 1	.....	− .1	.....	.75	.34	.....
31	− 1	.....	− .1	.....	.7	.....	.....

NOTE.—Heights previous to May 11 refer to old station in the city of Santa Fe. Heights May 12 to July 16 refer to gage established May 12 3½ miles above Santa Fe.

Daily discharge, in second-feet, of Santa Fe Creek near Santa Fe, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	0.2	0.2	0.2	.....	0.8	6.0	0.4
2	.2	.2	.2	.....	.....	5.4	.4
3	.2	.2	.2	.....	.....	5	.4
4	.2	.2	.2	.....	.....	4.4	.4
5	.2	.2	.2	.....	.....	3.7	.4
6	.2	.2	.2	.....	.....	3.2	1.9
7	.2	.2	.2	.....	.....	2.3	3
8	.2	.2	.2	.....	.....	2.2	3
9	.2	.2	.2	.....	.....	1.8	3
10	.2	.2	.2	.....	.....	1.2	3
11	.2	.2	.2	.....	.....	1.2	3
12	.2	.2	.2	.....	16	1.2	3
13	.2	.2	.2	.....	22	1.2	3
14	.2	.2	.2	.....	19	1.2	3.7
15	.3	.2	.2	.....	16	.4	1.9
16	.2	.2	.2	.....	12	.4	.4
17	.2	.2	.2	.....	12	.4	.....
18	.2	.2	.2	.....	12	.4	.....
19	.4	.2	.2	0.8	10	.4	.....
20	.4	.2	.2	1.5	8	.4	.....
21	.2	.2	.2	1.5	8	.4	.....
22	.2	.2	.2	2	7.2	.4	.....
23	.2	.2	.2	1	6	.4	.....
24	.2	.2	.2	1	5.8	.4	.....
25	.2	.2	.2	2	5.6	2.4	.....
26	.2	.2	.2	2	5.4	.4	.....
27	.2	.2	.2	2	5.4	.4	.....
28	.2	.2	.2	2	5.4	.4	.....
29	.2	.....	.2	2	5.4	.4	.....
30	.2	.....	.2	2	7.2	.4	.....
31	.2	.....	.2	.....	6	.....	.....

NOTE.—Daily discharges for Jan. to May 1 have been estimated from records taken at the old station. Practically no flow from April 1 to 18. Discharges for May 12 to July 16 were obtained from a fairly well defined rating curve based on measurements made at the station established May 12.

Monthly discharge of Santa Fe Creek near Santa Fe, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January			0.22	13.5	C.
February			.20	11.1	C.
March			.20	12.3	C.
April			.66	39.3	C.
May (21 days)			9.30	387	B.
June	6.0	0.4	1.61	95.8	B.
July 1–16	3.7	.4	1.93	61	B.

SANTA FE WATER & LIGHT CO.'S DITCH NEAR SANTA FE, N. MEX.

The Santa Fe Water & Light Co.'s ditch diverts water from Santa Fe Creek about 3 miles above Santa Fe.

A vertical gage rod was established on the ditch June 7, 1910, at a point about one-fourth mile below the intake and about 600 feet above the cable station on the creek. A gage height record was obtained for June 7 to 30.

Discharge measurements of Santa Fe Water & Light Co.'s ditch near Santa Fe, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 17	C. D. Miller	3.3	1.1	0.70	1.0
Sept. 24	do			.52	(a)

[a] No flow.

Daily gage height, in feet, of Santa Fe Water & Light Co.'s ditch near Santa Fe, N. Mex., for 1910.

[John Catanache, observer.]

Day.	June.	Day.	June.	Day.	June.
1		11	1.18	21	.90
2		12	1.10	22	.90
3		13	1.05	23	.88
4		14	1.05	24	.88
5		15	1.10	25	1.05
6		16	1.07	26	.98
7	1.20	17	1.02	27	.98
8	1.20	18	.95	28	.98
9	1.18	19	.95	29	.95
10	1.18	20	.92	30	.86

RIO PUERCO BASIN.

DESCRIPTION.

Rio Puerco rises in the mountains in the southern part of Rio Arriba County, N. Mex., and flows in a general southerly course about 100 miles across Sandoval, Bernalillo, and Valencia counties to its

junction with the Rio Grande near La Joya. It drains a large area but is dry at its mouth during the winter and early spring. It holds a constant stream as far south as Casa Salazar, a point southwest of Jemez, and from there on the water is caught during floods, by brush dams which wash away each winter and must be rebuilt in the spring.

San Jose River, the principal tributary of Rio Puerco, or, as known at the headwaters, Bluewater Creek, enters from the west. This river must discharge an enormous amount of flood water, for its drainage area is large, but normally it is a small stream which flows constantly at all seasons for some 3 miles below Laguna, where in summer it evaporates. Brush dams are used also at some points on this creek.

RIO PUERCO AT RIO PUERCO, N. MEX.

This station was established September 7, 1910, at the Atchison, Topeka & Santa Fe Railway bridge crossing Rio Puerco between the railway stations of Pavo and Rio Puerco. It is a short distance below the mouth of San Jose Creek.

A Friez automatic gage is fastened to a timber retaining wall on the left bank.

Discharge measurements of Rio Puerco at Rio Puerco, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 5	J. B. Stewart				[a]0.5
7	do				[a]1.0
11	J. A. Nicolay				[a].5
18	do	6	0.8		.5
21	J. B. Stewart				[a].2
25	J. A. Nicolay	19	14.7		24.3
Oct. 2	do	6	.7		.64
9	do	8	.8		.44
16	do	7	.8		.44
30	do	14	10.4		8.7
Nov. 6	do	14	4.4		3.33
12	J. B. Stewart				[a]5.0
13	J. A. Nicolay	14	4.4	0.5	4.28
20	do	16	5.2	.4	4.84
27	do	16	5.0	.4	5.0
Dec. 4	do	6	1.5	.2	1.34
11	do	6	1.7	.3	1.54

[a] Discharge estimated.

Daily gage height, in feet, of Rio Puerco at Rio Puerco, N. Mex., for 1910.

[J. A. Nicolay, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		0.2	11		0.3	21	0.4	
2		.2	12			22	.4	
3		.2	13	0.5		23	.35	
4		.2	14	.5		24	.3	
5		.1	15	.5		25	.3	
6		.1	16	.45		26	.3	
7		.25	17	.45		27	.4	
8		.35	18	.45		28	.25	
9		.2	19	.4		29	.2	
10		.3	20	.4		30	.2	

NOTE.—From Sept. 11 to Nov. 13, low-water stages were not recorded on automatic register. Two small rises occurred, one on Sept. 21 and the other Oct. 17.

RIO PUERCO NEAR LA JOYA, N. MEX.

This station was established September 10, 1910, at the Atchison, Topeka & Santa Fe Railway bridge crossing the stream one-half mile above its mouth and about 2 miles north of La Joya.

A Friez automatic gage is fastened to the downstream end of bridge pier.

Discharge measurements of Rio Puerco near La Joya, N. Mex., in 1910.

Date.	Hydrographer.	Discharge.
		Sec.-ft.
Sept. 10	J. B. Stewart	[a]0.5
21	do	[a].2
Nov. 13	do	[a]1.0

[a] Discharge estimated.

NOTE.—Low-water stages are not recorded on automatic register. With the exception of slight rises on Sept. 22 and Oct. 18, the stream has been carrying less than 1 second-foot.

SAN JOSE RIVER NEAR SUWANEE, N. MEX.

This station was established September 6, 1910, about 1¼ miles below Suwanee, a station on the coast line of the Atchison, Topeka & Santa Fe Railway, about 50 miles west of Albuquerque. The station is below all important diversions and tributaries and several miles above the mouth of the river. A large spring discharges into the stream from the right about one-eighth mile above the station.

A Friez automatic gage is located on left bank.

Discharge measurements of San Jose River near Suwanee, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 30	J. B. Stewart	52.5	31.3	2.30	99.5
31	do	66	47.8	2.80	164
Sept. 6	do	9	1.6	.48	2.1
11	H. W. Ordeman	10	2.4	.50	2.4
18	do	12	1.9	.50	1.9
25	do	12	2.5	.7	3.9
Oct. 2	do	8	1.2	.5	.81
9	do	8	1.0	.5	.50
16	do	8	1.1	.5	.67
23	do	14	3.0	.8	6.09
30	do	12	2.8	.5	3.9
Nov. 6	do	14	4.0	.8	6.28
12	J. B. Stewart	10.5	3.0	.62	4.4
13	H. W. Ordeman	16	4.9	.7	5.4
20	do	15	4.3	.7	4.8
27	do	10	1.8	.5	2.15
Dec. 4	do	10	1.2	.4	.61
11	do	14	3.4	.7	4.78

NOTE.—Measurements made by wading.

Daily gage height, in feet, of San Jose River near Suwanee, N. Mex., for 1910.

[H. W. Ordeman, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		0.7	0.55	0.45	16	0.5	0.65	0.7	
2		.6	.55	.5	17	.5	2.05	.7	
3		.5	.55	.5	18	.5	1.1	.7	
4		.5	.6	.45	19	.7	.65	.7	
5		.5	.65	.45	20	1.0	.65	.7	
6		.5	.8	.45	21	1.8	.6	.75	
7	0.5	.5	.75	.55	22	4.2	.95	.75	
8	.5	.5	.7	.55	23	4.0	.85	.75	
9	.5	.5	.65	.6	24	3.3	.7	.75	
10	.5	.5	.6	.65	25	.7	.65	.75	
11	.5	.5	.6	.7	26	.7	.65	.65	
12	.5	.5	.65		27	.7	.65	.5	
13	.5	.5	.7		28	.7	.6	.5	
14	.5	.5	.7		29	.7	.55	.5	
15	.5	.5	.7		30	.7	.55	.5	
					31		.55		

Daily discharge, in second-feet, of San Jose River near Suwanee, N. Mex., for 1910.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		5.0	2.2	0.9	16	1.9	4	5	
2		3	2.2	1.4	17	1.9	75	5	
3		1.4	2.2	1.4	18	1.9	17	5	
4		1.4	3	.9	19	5	4	5	
5		1.4	4	.9	20	13	4	5	
6		1.2	7	.9	21	55	3	6	
7	2.4	1.2	6	2.2	22	422	12	6	
8	2.4	1.2	5	2.2	23	380	8	6	
9	2.4	1	4	3	24	245	5	6	
10	2.4	1	3	4	25	5.5	4	6	
11	2.4	1	3	5	26	5.5	4	4	
12	2.2	1	4		27	5	4	1.4	
13	2.2	1	5		28	5	3	1.4	
14	2.0	1	5		29	5	2.2	1.4	
15	2.0	1	5		30	5	2.2	1.4	
					31		2.2		

NOTE.—Discharges obtained by the indirect method for shifting channels.

Monthly discharge of San Jose River near Suwanee, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Sept. 7–30	422	1.9	47.0	2,240	B.
October	75	1.0	5.69	350	C.
November	7.0	1.4	4.17	248	C.
Dec. 1–11	5.0	.9	2.07	45	C.

MIMBRES RIVER BASIN.

DESCRIPTION.

Mimbres River rises on the western slope of the Mimbres Range in the extreme northeastern part of Grant County, N. Mex., and takes a general southeasterly course to the western part of Dona Ana County, where its waters are lost.

Cameron Creek, which flows through the Fort Bayard military reservation, may send its flood waters to the Mimbres.

MIMBRES RIVER NEAR FAYWOOD, N. MEX.

The station, which is located about 6 miles southeast of Faywood Hot Springs and 10 miles from Faywood station, on the Silver City branch of the Santa Fe Railway, was established April 23, 1908, to determine the amount of water available for storage.

No important tributaries enter in the vicinity of the station, though many intermittent tributaries come in both above and below. The drainage area is about 450 square miles.

Some water is used for irrigation in the Mimbres Valley below the station, but as this is primarily a flood stream and as storage has not been provided, such irrigation is uncertain. By storing the flood water and cutting off the underflow at the Rio Mimbres dam site it will be possible to reclaim several thousand acres of land along this stream.

The gage is located about 400 feet below the proposed Rio Mimbres reservoir dam site. The gage datum was lowered 4 feet on July 8, 1909, and was afterwards raised 3 feet on August 13, 1909, when a Friez automatic gage was installed 200 feet above the chain gage on the right bank.

The flow of the stream at the gaging station is not usually affected by ice during the winter months. As the channel shifts a great deal, frequent measurements are necessary at high and medium stages to obtain the best results. Measurements during high stages are made from a cable 1,000 feet below the automatic gage.

Discharge measurements of Mimbres River near Faywood, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 13	J. B. Stewart	7.7	2.5	0.79	4.3
Mar. 18	do	6.5	2.9	.72	3.2
23	do	7.0	2.9	.70	3.1
May 8	C. D. Miller	8.3	2.33	.65	1.8
July 2	J. B. Stewart			.54	[a] .5
Sept. 20	do				[b]

[a] Estimated. [b] Stream dry.

Daily gage height, in feet, of Mimbres River near Faywood, N. Mex., for 1910.

[R. J. Trujillo, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Nov.
1	1.0	1.0	0.7	0.7	0.7	0.65	0.55	1.0	0.9	
2	1.0	.95	.7	.65	.7	.65	.55	.95		
3	1.0	.95	.7	.65	.7	.65	.5	.95	.9	
4	1.0	.95	.7	.65	.7	.65	.5	.95	.9	
5	1.0	.95	.7	.65	.65	.7	.5	.95	.9	0.8
6	.95	.9	.7	.65	.65	.7	.5	.95	.9	
7	1.0	.85	.7		.65	.7	.65	.95	.8	
8	.95	.85	.7		.65	.7	.55	.95	.75	
9	.95	.8	.7		.65	.7	.55	1.1		
10	.95	.8	.7		.65	.7	.6	1.7		
11	1.0	.8	.7		.65	.7	.6	1.1		
12	1.0	.8	.7		.65	.7	.6	1.05		
13	1.0	.8	.7		.7	.7	.6	1.05		
14	1.0	.8	.7	.7	.7	.7	.6	1.0		
15	1.0	.8	.7	.7	.7	.7	1.1	1.2		
16	1.0	.8	.7	.7	.65	.7		1.2		
17	1.0	.75	.7	.7	.65	.7		1.1		
18	1.0	.75	.7	.7	.65	.7	.8	1.1	1.1	
19	1.0	.75	.7	.7	.65	.7	.8	1.1		
20	1.0	.75	.7	.7	.65	.7		1.1		
21	.95	.75	.7	.7	.65	.7		1.1		
22		.75	.7	.7	.65	.7		1.1		
23		.7	.7	.7	.65	.65		1.1		
24		.7	.7	.7	.65	.8	.8	1.4		
25		.7	.7	.7	.65	.55	.75	.95		
26		.7	.7	.7	.65	.9	.7	.9		
27		.7	.7	.7	.65	.55	.7	.9		
28		.7	.7	.65	.65	.55	1.25			
29			.7	.7	.65	.55	1.1			
30	1.0		.7	.7	.65	.55	.9			
31	1.0		.7		.65		.9			

NOTE.—No flow after Sept. 8, except Sept. 18 and Nov. 5, when small floods occurred.

Daily discharge, in second-feet, of Mimbres River near Faywood, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.5	10	2.0	2.5	2.5	1.6	0.5	17	8
2	4.5	8	2	1.6	2.5	1.6	.5	12	8
3	4.5	8	2	1.6	2.5	1.6	0	12	8
4	4.5	8	2	1.6	2.5	1.6	0	12	8
5	4.5	8	2	1.6	1.6	2.5	0	12	8
6	3	8	2	1.6	1.6	2.5	0	12	8
7	5	4	2	2	1.6	2.5	1.0	12	3
8	3	4	2	2	1.6	2.5	0	12	2
9	3	3.5	2	2	1.6	2.5	0	27	.....
10	3	3.5	2	2	1.6	2.5	.2	196	.....
11	5	4.0	2.5	2	1.6	2.5	.2	27	.....
12	5	4.5	2.5	2	1.6	2.5	.2	21	.....
13	5.5	5	2.5	2	2.5	2.5	.2	21	.....
14	5.5	5	2.5	2.5	2.5	2.5	.2	16	.....
15	5.5	5	2.5	2.5	2.5	2.5	33	42	.....
16	5.5	5	2.5	2.5	1.6	2.5	9	42	.....
17	6	3	2.5	2.5	1.6	2.5	4.5	28	.....
18	6	3	2.5	2.5	1.6	2.5	4.5	28	.....
19	6	3	2.5	2.5	1.6	2.5	4.5	28	.....
20	6	3	2.5	2.5	1.6	2.5	4.5	28	.....
21	6	3	2.5	2.5	1.6	2.5	4.5	28	.....
22	4	3	2.5	2.5	1.6	2.5	1.0	28	.....
23	4	2	2.5	2.5	1.6	1.6	1.0	28	.....
24	4	2	2.5	2.5	1.6	6.0	4.5	86	.....
25	5	2	2.5	2.5	1.6	.5	2.5	10	.....
26	5	2	2.5	2.5	1.6	12.5	1.0	8	.....
27	6	2	2.5	2.5	1.6	.5	1.0	8	.....
28	6	2	2.5	1.6	1.6	.5	57	8	.....
29	7	.....	2.5	2.5	1.6	.5	30	8	.....
30	8	.....	2.5	2.5	1.6	.5	9	8	.....
31	8	.....	2.5	.....	1.6	.....	9	8	.....

NOTE.—Daily discharges obtained by indirect method for shifting channels and are only approximate. No discharge after Sept. 8, except Sept. 18 and Nov. 5, which have been estimated at 25 and 5 second-feet, respectively.

Monthly discharge of Mimbres River near Faywood, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	8	3	5.11	314	D.
February	10	2	4.41	245	D.
March	2.5	2	2.34	144	C.
April	2.5	1.6	2.20	131	C.
May	2.5	1.6	1.80	111	C.
June	12.5	.5	2.47	147	D.
July	57	0	5.92	364	D.
August	196	.....	2.69	1,650	D.
September	25	0	2.60	155	D.
October	0	0	0	0	
November	5	0	.17	10.1	
December	0	0	0	0	
The year	196	0	2.47	3,270	

CAMERON CREEK BASIN.

CAMERON CREEK AT FORT BAYARD, N. MEX.

This station, which was established on January 17, 1907, at the request of the United States Forest Service, to obtain data concerning flood run-off, is located near the pumping station at Fort Bayard,

N. Mex., a United States Army post. The gage, a vertical rod, is a short distance above the crest of an old masonry dam, which was used to check the underflow of the creek.

For the greater part of the year the flow comes from springs, and amounts to less than 1 second-foot. Stevens Creek enters about 2 miles above this station.

The intake for the water supply of the post is above the station, and a little water is also diverted above for garden irrigation. The flood waters of this stream can probably be stored in natural depressions in the vicinity, which will make excellent reservoir sites. These can be supplied by feeder canals.

Ice does not appreciably affect the flow of the stream at this point. The channel has filled up with sediment above the dam, which doubtless has some effect on low-water measurements. The channel is probably permanent for measurements taken at higher stages. Unfortunately no high-water measurements have yet been made. Measurements are made by wading.

No change has been made in the datum of the gage during the maintenance of the station. Gage observations have been taken gratis by Sergt. T. J. McBurney, United States Army.

Discharge measurements of Cameron Creek at Fort Bayard, N. Mex., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 10	J. B. Stewart	1.48	[a] 0.3
May 8	C. D. Miller	1.4	[a] .2
Sept. 15	J. B. Stewart	.....	[b]
Nov. 18	T. J. McBurney	.....	[b]

[a] Estimated. [b] Creek dry.

Daily gage height, in feet, and discharge, in second-feet, of Cameron Creek at Fort Bayard, N. Mex., for 1910.

Date.	Gage height.	Discharge.
Jan. 1–Feb. 9	1.35	0.2
Feb. 10–June 2	1.5	.2
June 3–4	1.55	.5
June 5–July 26	1.5	.2
July 27	2.0	13.0
July 28–Aug. 13	1.5	.2
Aug. 14	1.65	1.0
Aug. 15–Sept. 11	1.5	.2
Sept. 12–16	(a)	0
Sept. 17–24	1.5	.2
Sept. 25–Nov. 3	(a)	0
Nov. 4	1.7	2.0
Nov. 5–Dec. 31	(a)	0

[a] Creek dry.

NOTE.—The gage heights for low stages are not a true index of the discharge.

Monthly discharge of Cameron Creek at Fort Bayard, N. Mex., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
January	0.2	12.3
February	.2	11.1
March	.2	12.3
April	.2	11.9
May	.2	12.3
June	.22	13.1
July	.61	37.5
August	.23	14.1
September	.13	7.7
October	0	0
November	.067	4.0
December	0	0
The year	.183	136

NOTE.—Estimates of monthly discharge are only approximate. The minimum steady flow for the year was estimated to be 0.2 second-foot. There was no flow during October and December, most of November, and portions of September.

STEVENS CREEK NEAR FORT BAYARD, N. MEX.

This station, which was established January 17, 1907, at the request of the United States Forest Service, is located one-fourth mile above the Fort Bayard planting station of the Forest Service, 3 miles north of Fort Bayard.

The records furnish valuable information concerning normal and flood run-off. The station is situated about 2 miles above the junction of this stream with Cameron Creek.

The normal flow of this creek is very small, but for short periods during floods it occasionally carries a large flow, which can probably be stored. The intake for the water supply of the planting station is above the gage.

The records of this station are little, if any, affected by ice. The results obtained have not been very satisfactory, owing to the small number of discharge measurements, none of which were taken when there was any considerable flow in the stream.

No change has been made in the datum of the gage since the establishment of the station.

Discharge measurements of Stevens Creek near Fort Bayard, N. Mex., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 10	J. B. Stewart	1.40	[a] 0.2
Mar. 4	do	1.47	[a] .3
May 8	C. D. Miller	1.39	[b]
Sept. 15	J. B. Stewart		[a] .1

[a] Estimated. [b] Practically no flow.

Daily gage height, in feet, of Stevens Creek near Fort Bayard, N. Mex., for 1910.

[Harry C. Turner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1				1.39				
2		1.43						
3			1.43					
4	1.40		1.47	1.39				1.50
5		1.43	1.39					
6								
7	1.40			1.39				
8			1.39		1.38			1.60
9		1.43						1.10
10	1.41	1.40						
11							1.90	
12		1.43	1.39	1.39				
13	1.41							
14		1.42						
15	1.41			1.39				
16								
17	1.42	1.43						
18			1.39					
19								
20	1.42			1.40				
21		1.43						
22			1.39					
23								
24		1.43		1.40				
25	1.43		1.39					
26								
27						2.10		
28		1.43	1.39					
29	1.43							
30								
31								

NOTE.—Water diverted for irrigation on Mar. 5. There was practically no flow after this date except at times of small floods when water was flowing past the gauge for periods of less than one hour to three hours.

RIO TULAROSA BASIN.

RIO TULAROSA AT MESCALERO, N. MEX.

Rio Tularosa rises in the southwestern part of the Mescalero Apache reservation, N. Mex., flows northwestward to a point 2 miles beyond the agency, then turns and flows southwestward about 18 miles to the flats in the northeastern part of Dona Ana County.

The station was established November 27, 1910, at a wagon bridge crossing the stream just inside of the gate into an alfalfa field about one-fourth mile below the Indian agency. It is about 300 yards below the ditch which carries the tail water from the agency power house. A vertical rod gage is fastened to upstream end of left abutment.

The following discharge measurement was made by J. B. Stewart:

November 27, 1910: Width, 5.2 feet; area, 4.7 square feet; gage height, 1.82 feet; discharge, 13.6 second-feet.

Daily gage height, in feet, of Rio Tularosa at Mescalero, N. Mex., for 1910.

[Hiram Jones, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.
1	1.9	11	2.1	21	1.95
2	1.9	12	1.9	22	1.85
3	1.85	13	1.95	23	2.5
4	1.85	14	1.95	24	1.9
5	1.9	15	1.85	25	
6	1.9	16	1.8	26	1.9
7	1.85	17	1.85	27	1.95
8	1.9	18	1.95	28	1.9
9	1.9	19	2.0	29	2.5
10	1.8	20	1.9	30	2.0
				31	2.0

RIO LA LUZ BASIN.

RIO LA LUZ NEAR LA LUZ, N. MEX.

Rio La Luz, a stream about 2 miles long, rises in the southwestern part of the Mescalero Apache reservation and flows westward through a canyon to La Luz, in Dona Ana County. Its principal tributary is Fresnal River.

This station, which was established August 13, 1910, is located about 200 feet above Ranger's cabin, which is 1 mile above La Luz. It is about 200 feet above head of the development ditch, the uppermost diversion of any importance, and half a mile below the mouth of Fresnal River.

A vertical rod gage was located on the right bank. This gage was destroyed by flood on August 17, and on November 23 a new gage was installed at a different datum.

Discharge measurements of Rio La Luz near La Luz, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 13	W. B. Freeman	18.3	5.9	1.58	13.7
Nov. 23	J. B. Stewart	7.5	4.4	1.00	13.5

NOTE.—Measurements made by wading. Gage heights of measurements are referred to different datums.

Daily gage height, in feet, of Rio La Luz River near La Luz, N. Mex, for 1910.

Day.	Aug.	Day.	Aug.
13	1.6	16	1.6
14	1.6	17	2.6
15	1.6		

PECOS RIVER BASIN.

DESCRIPTION.

Pecos River, the largest tributary of the Rio Grande, rises on the east side of the Santa Fe Range in northern New Mexico, flows south through eastern New Mexico, then southeast through southwestern Texas, and unites with the Rio Grande about 400 miles (by river) below El Paso. Except for some of the upper tributaries, the branches of the Pecos are intermittent, carrying large floods at times. From source to mouth the river is about 800 miles long, and the total drainage area includes more than 32,000 square miles, of which 23,000 are in New Mexico and 9,000 in Texas.

The upper Pecos flows as a typical mountain stream through narrow valleys and deeply cut gorges, but below Fort Sumner the canyon-like walls are replaced by low hills, and when the river reaches Roswell the gradation from the flood plains to the prairie is imperceptible. Arroyos and gulches are rare, and canyons are practically unknown. The mountain tributaries of the upper Pecos rise at elevations of about 11,000 feet; at Santa Rosa, N. Mex., the elevation of the river is 4,600 feet; at Roswell, 3,500 feet; at Pecos, Tex., 2,550 feet; and at the mouth of the stream it is 1,000 feet.

The main Pecos may be said to be formed by the junction of the Gallinas with the upper Pecos at La Junta, N. Mex. The most important tributaries below this point and above Roswell are the Agua Negra and the Agua Negra Chiquita, which enter just above Puerto de Luna. Except for small springs, no important tributaries enter along this stretch, but some of the dry gulches and arroyos occasionally carry large quantities of flood water. Among the most important of the lower tributaries are the Hondo, Rio Felix, the Penasco, Seven Rivers, and Black River.

It is rather a striking fact that the Pecos receives practically no tributaries from the east, probably because of the pervious character of the soil of the Staked Plains, upon which there is no surface drainage system. The water sinks into limestone rocks and establishes an underground drainage.

The condition of the Pecos basin may be characterized roughly as follows: Merchantable-timber land, 1,300 square miles; woodland, 2,400 square miles; 300 square miles of burnt and cut over land; and the remaining area of about 27,000 square miles is open and sagebrush land.

The rainfall along the Pecos in New Mexico ranges from 20 to 25 inches in the mountainous sections, as above Las Vegas and at Cloudcroft, to about 15 inches in the plains country, or in the vicinity of Roswell and Carlsbad. Through Texas the rainfall is light, the annual average being about 12 inches.

During the winter period the flow of the Pecos is supplied mainly by springs. The river has been known to go dry in the neighborhood of Colonias, N. Mex. (See Pl. III, *A*.)

Considerable ice forms on the upper Pecos, and heavy snows are common. In the vicinity of Santa Rosa and Fort Sumner thin ice and slush ice are in evidence during a part of the winter. Lower down the valley there is an occasional light snow, which disappears very quickly, and at times there is thin ice along the edges of the river. In the lower end of the valley the climate is mild. The rainfall comes mainly in the summer months, in the form of showers, and is variable and uncertain.

Irrigation in New Mexico has reached its highest stage of development in the lower Pecos Valley, the irrigated district beginning a short distance above Roswell and continuing into Texas. Thousands of acres are under cultivation, and a wisely planned system of reservoirs and canals is in operation. The surface waters have been greatly augmented during the past few years by numerous artesian wells. Above this fertile belt comparatively little farming is done; below it irrigation is carried on only in a small way, as the return seepage water contains, unfortunately, so much alkali that it is unsuitable for irrigation.

The recently completed Carlsbad and Hondo projects of the Reclamation Service provide for the irrigation of 20,000 and 10,000 acres, respectively, while the proposed Urton Lake project, which is to be relinquished by the Reclamation Service in favor of a Carey Act project, will result in the irrigation of about 60,000 acres in the vicinity of old Fort Sumner, N. Mex.

Numerous reservoir sites are to be found along the Pecos and its tributaries. Among the reservoirs now in operation may be mentioned Lake McMillan on the Pecos, and the Hondo reservoir on Hondo River. Urton Lake, a natural depression in the vicinity of Fort Sumner, will have a storage capacity of 190,000 acre-feet. It is to be supplied by a feeder canal from Pecos River. Because of the large amount of silt carried by this stream the prevention of its deposition must be taken into account and provided for in the construction of reservoirs.

On account of its long periods of low water, this stream does not offer many favorable opportunities for the development of power. At present there are no water-power plants of any importance in operation in the basin, except a public-utility plant of about 300 horsepower at Carlsbad, N. Mex. Later there may be some power development in connection with irrigation projects.

The records along this stream are very fragmentary and most of them were taken within the last five or six years. From them it would appear that 1903 was a very low year and 1905 an unusually high one.

PROGRESSIVE DISCHARGE MEASUREMENTS BETWEEN RIBERA AND FORT SUMNER, N. MEX.[1]

In order to ascertain the amount of water sinking in the bed of the Pecos and to determine whether it reappears farther down the valley, a series of progressive discharge measurements were made March 9–16, 1910, between Ribera and Fort Sumner. (See fig. 1.)

FIGURE 1.—Map of upper part of Pecos River basin.

The trip was made more or less continuously along the river from Ribera to Colonias, where it was found impracticable to follow the river, and between Colonias and Santa Rosa the journey was made across the mesa west of the river. From Santa Rosa to a point about 4 miles below Puerto de Luna the course of the river was followed, after which it was not touched again until a point about 5 miles above Fort Sumner was reached. For nearly the entire dis-

[1] Report by G. H. Russell, junior engineer, United States Geological Survey.

tance the river flows through a series of red sandstone strata, ranging in thickness from a few feet to several hundred feet and overlain in the upper portions of the section by gypsum and limestone beds. The limestone and gypsum strata dip to the east, and at Colonias and also in the section below Santa Rosa are in turn overtopped by thick layers of sandstone interstratified with thin layers of gypsum.

The river bed throughout its course consists of sand, gravel, and bowlders. Quicksand is common. The bowlders appear in the more rapid stretches of the stream and the sand in the quieter stretches. For the most part the valley lies between steep bluffs, about 500 feet high, back of which is mesa land that is in places so cut by canyons and gulches that it is difficult to cross. The canyons carry water only after the heavier rains.

The mesa is covered with a thin coating of soil supporting a scant growth of gramma grass and scattering bunches of low pines and oak. It is practically uninhabited, for it is too dry for farming and even water for domestic purposes must be brought from the river. It is used principally for sheep and goat range, and for this use it seems best adapted. The uplands, however, include tracts of open level country which would be admirably suited to irrigation were water available. The feasibility of getting water to this elevation above the river can be determined only by detailed surveys, but it is rather doubtful because of the great length of ditch necessary and the rugged and stony character of the country through which it would have to be constructed.

Between San Miguel and La Cuesta the valley is about three-fourths of a mile wide and is irrigated in a crude way by water taken from the river. The farms are divided into small tracts and the labor is done largely by hand. The principal crops are oats, corn, beans, and Mexican peas.

Between La Cuesta and Anton Chico the river flows through a narrow box canyon affording a number of good sites for reservoirs. Between Anton Chico and Colonias the valley broadens again, the bluffs becoming less precipitous. A small area is irrigated in each of these places. From Colonias to Santa Rosa the valley is narrow. At Santa Rosa it broadens out considerably, narrows again about 5 miles below, and then gradually broadens and becomes shallower until at Fort Sumner the water flows among sandbars and the banks slope gradually back to the uplands.

Gallinas River, which enters the Pecos near La Junta, is the principal tributary in this stretch and the only one that carries a perennial flow. This flow, however, is small, and is derived from a series of springs about 8 miles above the mouth of the Gallinas. There is no regular flow of this river above the springs. The mouth of the Gal-

linas was not visited during this investigation. Residents, however, stated that little or no water was flowing there.

The discharge measurements except the one 4 miles below La Cuesta were taken successively during a journey down the stream. The La Cuesta measurement was made while going from Anton Chico to San Miguel. The river in this vicinity is almost inaccessible for a stretch several miles in length. All measurements were made at selected sections and are believed to be accurate. The following is a list of discharges:

Discharge measurements of Pecos River, Mar. 10–16, 1910.

Date.	Place.	Distance below Ribera.	Discharge.
		Miles.	*Second-feet.*
Mar. 11	San Miguel	0.5	92
11	1 mile above La Cuesta	14	87
10	4 miles below La Cuesta	19	89
12	1 mile below Anton Chico	30	81
12	1 mile above La Cueva	38	77
13	1 mile below Colonias	46	20
13	Santa Rosa	65	11
14	6 miles below Santa Rosa	71	86
14	4 miles below Puerto de Luna	87	88
16	At cable section, Fort Sumner	120	83

The water of the river probably begins to sink near Anton Chico, but the diminution of flow does not become noticeable until the stream reaches La Cueva. Between La Cueva and Colonias the stream crosses strata of porous limestone, into which it gradually disappears. At normal stages the water disappears a mile or more above Colonias. Three days before the measurement was made no water was passing Colonias, but a day or so before these measurements were begun there was a small rise in the river caused by melting snows in the lower mountains. The measurements below Santa Rosa were made in advance of the rise. The above data will be used on the assumption that the river was fairly constant in stage during measurements from Ribera to Colonias and from Santa Rosa to Fort Sumner.

The difference between the discharge at the point 4 miles below La Cuesta and at Colonias is 69 cubic feet per second. As usually no water sinks below Colonias, this 69 second-feet must be the normal amount of water disappearing. The amount reaching the river 6 miles below Santa Rosa at normal stage is 85 to 90 second-feet. This would indicate an increase of about 20 second-feet over the amount sinking above Santa Rosa. An inspection of the topographic sheets of this section indicates that the waters sinking above Colonias reappear in the region of Santa Rosa. This conclusion has been strengthened by observations across the mesa between

Colonias and Santa Rosa. A chain of sinks, or so-called dry lakes, extends from a point near the place of sinking to the flowing lakes at Santa Rosa (Pl. III, *B*). Some of these sinks are smooth depressions covering several acres; others are holes 50 feet in diameter. The latest formed depressions have vertical sides and range in depth from a few feet to a hundred feet or more. Erosion gradually rounds off the edges and fills the middle until there remains only a pot-shaped depression. Some of these depressions have been formed since the settlement of the country. It is said that a man living upon the mesa found one morning in front of his house a hole 60 feet in diameter and about 150 feet deep. A story is also told of a suddenly formed depression that filled with water and was claimed by two men. The controversy was taken to court, but before a decision was rendered the water disappeared, leaving only a dry hole.

The lakes near Santa Rosa are 200 to 300 feet in diameter, and some of them are reported to have been sounded to a depth of about 250 feet. They receive no surface drainage, but each yields a constant outflow of several second-feet. The surface of these lakes is only a few feet above the river and is 300 to 400 feet below the level of the sink holes on the mesa. The water is heavily charged with gypsum and gives off a "gyppy" odor.

These sinks afford conclusive evidence of solution in the gypsiferous beds, and the course of their succession, leading from the place where the river sinks to the point where the water reappears in the lakes, forms strong presumptive evidence that underground passages are followed by the water between those points. The incident mentioned above, in which a depression formed by a cave-in filled with water, also affords evidence of underground passage. In this case it is reasonable to conclude that the cave-in choked some subterranean watercourse, thus forcing the water up into the depression until it acquired sufficient head to reopen its channel, when the pent-up water in the depression sank away.

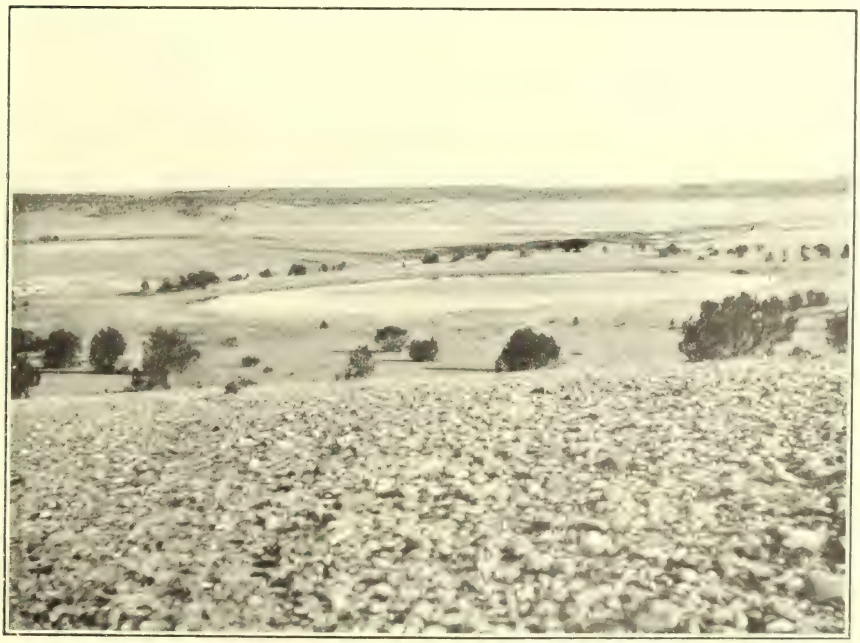
As no surface water enters the stream between Santa Rosa and Colonias the increase of 20 second-feet of the discharge at Puerto de Luna over that at La Cuesta must also come from some subterranean source. Part of this may be derived from the sinking of the Gallinas above the springs. The remainder can probably be accounted for as ground water.

PECOS RIVER AT COWLES, N. MEX.

This station, which was established March 9, 1910, is located about three-fourths of a mile below Cowles post office, 13 miles above Pecos, about 20 miles northeast of Glorieta, a station on the Atchison, Topeka & Santa Fe Railway, and 24 miles by trail from Santa Fe.

A. PECOS RIVER 3 MILES BELOW COLONIAS, N. MEX.

There is no water at this point except when the river is above normal.



B. BLUE HOLE, ONE OF THE FLOWING LAKES NEAR SANTA ROSA, N. MEX.

It is at the second wagon bridge above Holy Ghost Creek, about halfway between that creek and Willow Creek.

A Friez automatic gage is located on the left bank.

Discharge measurements of Pecos River at Cowles, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 7	Stewart and Fisher	31	33	.....	79
8	.....do	31	34	.....	80
9	.....do	31	32	1.30	72
10	J. B. Stewart	31	31	1.23	64
Apr. 23	.....do	37	57	1.82	173
23	.....do	48	59	1.82	181
June 9	.....do	35	43	1.50	105
Aug. 20	Stewart and Mills	34	34	1.18	52
Sept. 7	W. W. Mills	33	26	1.05	36
Oct. 31	J. B. Stewart	33	22	.98	25

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of Pecos River at Cowles, N. Mex., for 1910.

[Encarnacion Rivera, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.3	2.5	1.8	1.2	1.25	1.05	1.05	1.0	0.95
2	.....	1.25	2.45	1.75	1.2	1.25	1.0	1.05	1.0	.95
3	.....	1.3	2.4	1.75	1.2	1.25	1.05	1.05	1.0	.9
4	.....	1.3	2.4	1.7	1.2	1.45	1.05	1.05	1.0	.9
5	.....	1.3	2.45	1.6	1.2	1.4	1.05	1.05	1.0	.85
6	.....	1.3	2.4	1.6	1.2	1.3	1.05	1.0	.9	1.0
7	.....	1.25	2.4	1.55	1.2	1.2	1.05	1.0	.9	.95
8	.....	1.25	2.35	1.5	1.15	1.2	1.0	1.0	.9	.9
9	1.3	1.25	2.35	1.45	1.2	1.3	1.0	1.0	.9	.9
10	1.25	1.25	.....	1.4	1.2	1.35	1.0	1.0	.9	.9
11	1.25	1.4	.....	1.5	1.2	1.4	1.0	1.0	.95	.9
12	1.25	1.4	.....	1.6	1.25	1.55	1.0	1.0	.95	.9
13	1.25	1.45	.....	1.7	1.3	1.35	1.0	1.0	1.0	.9
14	1.3	1.45	2.5	1.6	1.3	1.3	1.05	1.0	1.0	.85
15	1.3	1.4	2.5	1.6	1.2	1.25	.....	1.0	1.0	.85
16	1.25	1.4	2.4	1.55	1.2	1.25	.....	1.05	1.05	.1
17	1.25	1.4	2.3	1.5	1.2	1.25	1.0	1.05	1.0	1.2
18	1.25	1.5	2.25	1.45	1.25	1.2	1.0	1.1	1.05	1.35
19	1.3	1.6	2.1	1.4	1.2	1.2	1.05	1.05	1.0	1.5
20	1.3	2.0	2.0	1.35	1.2	1.2	1.0	1.05	.97	1.55
21	1.3	1.75	2.0	1.35	1.2	1.15	1.05	1.05	1.0	1.55
22	1.35	1.7	1.95	1.3	1.2	1.15	1.05	1.0	1.0	1.55
23	1.45	1.85	1.9	1.3	1.2	1.1	1.0	1.0	.99	1.6
24	1.5	2.0	.....	1.3	1.2	1.05	1.0	1.0	.99	1.6
25	1.5	2.15	.....	1.35	1.35	1.05	1.0	1.0	.98	1.6
26	1.5	2.25	.....	1.35	1.3	1.0	1.0	1.0	1.0	1.6
27	1.45	2.3	.....	1.4	1.25	1.0	1.0	1.0	.9	1.6
28	1.45	2.4	1.8	1.3	1.2	1.0	1.0	.95	.9	1.6
29	1.4	2.55	.....	1.3	1.25	1.0	1.0	.95	.9	1.6
30	1.35	2.4	1.8	1.25	1.3	1.05	1.0	.95	.9	1.6
31	1.35	.....	1.8	.....	1.3	1.1	.....	.95	.....	1.6

NOTE.—Probably affected by ice Dec. 16–31.

Daily discharge, in second-feet, of Pecos River at Cowles, N. Mex., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	70	370	172	55	62	36	36	30	25
2	.....	62	355	160	55	62	30	36	30	25
3	.....	70	340	160	55	62	36	36	30	20
4	.....	70	340	148	55	98	36	36	30	20
5	.....	70	355	127	55	88	36	36	30	17
6	.....	70	340	127	55	70	36	30	26	30
7	.....	62	340	117	55	55	36	30	20	25
8	.....	62	325	107	48	55	30	30	20	20
9	70	62	325	98	55	70	30	30	20	20
10	62	62	325	88	55	79	30	30	20	20
11	62	88	340	107	55	88	30	30	25	20
12	62	88	340	127	62	117	30	30	25	20
13	62	98	355	148	70	79	30	30	30	20
14	70	98	370	127	70	70	36	30	30	17
15	70	88	370	127	55	62	36	30	30	17
16	62	88	340	117	55	62	30	36	36	.....
17	62	88	310	107	55	62	30	36	30	.....
18	62	107	295	98	62	55	30	42	36	.....
19	70	127	251	88	55	55	36	36	30	.....
20	70	223	223	79	55	55	30	36	27	.....
21	70	160	223	79	55	48	36	36	30	.....
22	79	148	210	70	55	48	36	30	30	.....
23	98	184	197	70	55	42	30	30	29	.....
24	107	223	197	70	55	36	30	30	29	.....
25	107	266	197	79	79	36	30	30	28	.....
26	107	295	184	79	70	30	30	30	30	.....
27	98	310	184	88	62	30	30	30	20	.....
28	98	340	172	70	55	30	30	25	20	.....
29	88	384	172	70	62	30	30	25	20	.....
30	79	340	172	62	70	36	30	25	20	.....
31	79	.....	172	.....	70	42	.....	25	.....	.....

NOTE.—These discharges are based on a rating curve which is well defined between 25 and 225 second-feet.
Discharges interpolated for days when gage was not read.

Monthly discharge of Pecos River at Cowles, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Mar. 9–31	107	62	78.0	3,560	A.
April	384	62	147	8,750	B.
May	370	172	280	17,200	B.
June	172	62	106	6,310	A.
July	79	55	58.9	3,620	A.
August	117	30	58.5	3,600	A.
September	36	30	32.2	1,920	A.
October	42	25	31.7	1,950	A.
November	36	20	26.8	1,590	A.
December	30	.....	20.5	1,260	C.
The period	.....	.....	.....	49,800	

NOTE.—Discharge Dec. 16–31 estimated because of ice.

PECOS RIVER NEAR ANTON CHICO, N. MEX.

This station, which was established April 28, 1910, is located about 1 mile below the settlement of Tecolotito and $2\frac{3}{4}$ miles northwest of Anton Chico, which is 30 miles below Las Vegas and 34 miles above Santa Rosa. It is $1\frac{1}{4}$ miles below the mouth of Tecolote Creek.

A Friez automatic gage is located on the left bank.

Discharge measurements of Pecos River near Anton Chico, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	J. B. Stewart	106	135	2.05	280
30	do	96	125	2.25	363
June 11	do	45	44	.40	59
Aug. 10	do	62	56	1.00	123
Sept. 3	W. W. Mills	58	25	.00	26
Oct. 18	G. H. Russell	26	16	.00	22
20	do	29	21	.15	30.5

NOTE.—Measurements made by wading at various sections.

Daily gage height, in feet, of Pecos River at Anton Chico, N. Mex., for 1910.

[A. A. Abercrombie, observer.]

Day.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.
1			1.1	0.5		.05	−0.1	0.0
2		2.2	1.1			.0	− .1	.0
3			1.0			.0	− .1	.0
4			1.0		0.0	.0	− .1	− .05
5			1.0		− .05	.0	.0	− .1
6			1.0		− .05	.0	.0	− .1
7					.0	.0	.0	− .1
8				.6	.0	.05	.1	− .1
9		1.95		.15	.0	.05	.1	− .2
10				2.25	−1	.1	.0	− .15
11			.4	1.6	− .1	.1	.0	− .15
12			.4	.65	− .1	.1	.0	− .15
13			.5	.65	.1	.1	.0	− .15
14			.3	.65	.2	.1	− .05	− .15
15				.5	.2	.05	.0	− .15
16		2.1		.4	.2	.0	.0	− .1
17		2.0		.3	.15	.15	.0	− .1
18		2.0			.0	.1	.0	− .05
19		2.0			.15	.1	.0	− .1
20		2.0	.5		.2	.2	.0	− .1
21		1.9			.2	.2	.0	− .1
22		1.8		1.1	.2	.1	.0	− .1
23		1.6		.8	.2	.1	.0	− .1
24		1.4		.4	.05	.1	.0	− .15
25	2.0	1.2		.1	.0	.1	.0	− .1
26	2.0	1.1		.0	.0	.1	.0	− .1
27	2.0	1.0	.5	− .1	− .05	.1	.0	− .1
28	2.0	.95	.35	− .1	− .05	.1	.0	− .08
29	2.0	.95	.2		− .05	.0	.0	− .1
30	2.0	.95			.0	.0	.0	− .08
31		1.1				− .1		− .05

Daily discharge, in second-feet, of Pecos River near Anton Chico, N. Mex., for 1910.

Day.	Apr.	May.	June.	Aug.	Sept.	Oct.	Nov.	Dec.
1		310	138	61	22	26	20	23
2		332	138	60	24	23	20	23
3		330	123	60	26	23	20	23
4		330	123	50	23	23	20	21.5
5		310	123	50	21.5	23	23	20
6		310	123	60	21.5	23	23	20
7		300	100	60	23	23	23	20
8		290	80	71	23	26	28	20
9		282	60	32	23	26	28	17.5
10		280	50	342	20	28	23	18.5
11		290	52	219	20	28	23	18.5
12		290	52	76	20	28	23	18.5
13		300	61	76	28	28	23	18.5
14		300	43	76	35	28	21.5	18.5
15		310	40	61	35	26	23	18.5
16		312	40	52	35	23	23	20
17		292	50	43	32	32	23	20
18		292	50	40	23	28	23	21.5
19		292	60	40	32	28	23	20
20		292	61	50	35	35	23	20
21		273	60	50	35	35	23	20
22		255	60	138	35	28	23	20
23		219	60	94	35	28	23	20
24		185	60	52	26	28	23	18.5
25	292	153	60	28	23	28	23	20
26	292	138	60	23	23	28	23	20
27	292	123	61	20	21.5	28	23	20
28	292	116	48	20	21.5	28	23	20.5
29	292	116	35	20	21.5	23	23	20
30	292	116	20	20	23	23	23	20.5
31		138		20		20		21.5

NOTE.—These discharges are based on a rating curve which is well defined below 350 second-feet. The record for July is of no value. The river was very low; probably dry during part of the month.

Monthly discharge of Pecos River near Anton Chico, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Apr. 25–30	292	292	292	3,480	B.
May		116	254	15,600	C.
June	138		69.7	4,150	D.
August	342		66.6	4,100	D.
September	35		26.2	1,560	C.
October	35	20	26.6	1,640	B.
November	28	20	22.9	1,360	B.
December	23	17.5	20.0	1,230	B.

PECOS RIVER AT SANTA ROSA, N. MEX.

This station, which was established February 3, 1910, is located at Santa Rosa on the highway bridge crossing the river about 400 feet below the Chicago, Rock Island & El Paso Railroad bridge. It is about 1 mile above the mouth of Rio Agua Negra Chiquita and about 6 miles above the mouth of Canyon Pintada. The chain gage located on downstream side of bridge is set to read the same as old rod gage on Chicago, Rock Island & El Paso bridge pier. There is no

determined relation between the chain gage and the gage formerly used by the United States Reclamation Service.

Discharge measurements of Pecos River at Santa Rosa, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gauge height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 1	Russell and Stewart	28	12.5	1.35	12.7
3	do	29.5	13.8	1.38	12.8
Mar. 13	G. H. Russell	37	12.2	1.46	10.7
May 8	J. B. Stewart	93	70	2.37	206
June 19	do	29	25	1.47	36
Aug. 6	do	49.5	48	2.00	173
19	W. B. Freeman	133	274	2.95	1,550
19	do	116	145	2.00	570
20	do	97	102	1.48	315
23	W. W. Mills	34.1	28.8	.87	42
Oct. 16	G. H. Russell	34	9.4	.70	13.7

NOTE.—The measurements of Aug. 19 were made from the highway bridge. Other measurements made by wading.

Daily gage height, in feet, of Pecos River at Santa Rosa, N. Mex., for 1910.

[C. L. Justice, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.35	1.4	1.65	2.3	1.9	1.6	1.65	0.9	.....	0.65	0.65
2	.....	1.45	1.7	2.3	1.9	1.45	1.75	1.35	.....	.65	.6
3	1.4	1.45	1.6	2.3	1.95	1.35	1.65	.8	.....	.55	.55
4	1.5	1.45	1.55	2.25	2.2	1.4	1.7	.75	.....	.6	.6
5	1.5	1.45	1.45	2.25	2.2	1.3	1.95	.....	.....	.7	.65
6	1.4	1.45	1.45	2.25	2.1	1.35	2.45	.....	.....	.7	.65
7	1.4	1.45	1.45	2.2	2.0	1.35	2.05	.5	.....	.7	.65
8	1.4	1.45	1.45	2.35	1.9	1.4	1.8	.55	.....	.7	.7
9	1.5	1.5	1.5	2.35	1.9	1.35	3.1	.5	.....	.6	.65
10	1.5	1.45	1.45	2.45	1.85	1.3	3.15	.7	0.65	.65	.65
11	1.45	1.5	1.45	2.3	1.8	1.35	4.15	.6	.7	.6	.65
12	1.45	1.45	1.55	2.35	1.8	1.5	3.0	.65	.7	.65	.65
13	1.4	1.5	1.55	2.4	1.8	1.35	3.6	.6	.65	.6	.7
14	1.5	1.45	1.55	2.45	1.8	1.35	3.3	1.15	.65	.6	.75
15	1.4	1.45	1.65	2.4	3.1	1.7	3.35	1.35	.65	.7	.7
16	1.4	1.5	1.85	2.45	2.2	1.55	1.8	1.10	.6	.75	.6
17	1.45	1.5	1.90	2.4	1.95	1.45	1.5	.75	.55	.7	.65
18	1.5	1.6	1.85	2.5	1.75	1.5	4.85	.65	.55	.7	.65
19	1.5	1.6	1.8	2.35	1.6	1.45	2.85	.5	.7	.7	.7
20	1.5	1.6	1.85	2.35	1.45	1.5	1.6	.65	.75	.55	.65
21	1.45	1.55	1.95	2.2	1.4	1.4	1.25	.6	.55	.6	.6
22	1.45	1.55	2.05	2.25	1.4	1.4	1.0	.65	.55	.55	.65
23	1.4	1.55	2.1	2.2	1.3	1.55	1.3	.6	.6	.6	.6
24	1.45	1.6	1.95	2.25	1.35	1.4	1.75	.65	.55	.....	.65
25	1.45	1.6	2.05	2.15	1.3	1.85	1.55	.6	.6	.65	.65
26	1.5	1.6	2.15	2.15	1.3	1.6	1.1	.7	.5	.6	.65
27	1.45	1.75	2.15	2.05	1.3	1.4	.8	.5	.6	.65	.65
28	1.45	1.80	2.05	2.0	1.3	1.5	.65	.65	.6	.6	.7
29	.....	1.75	2.15	2.0	1.95	1.55	.65	1.0	.5	.7	.7
30	.....	1.75	2.25	1.95	2.2	1.6	.65	1.35	.65	.6	.7
31	.....	1.7	.....	1.9	.....	1.5	.85	.....	.6	.....	.6

Daily discharge, in second-feet, of Pecos River at Santa Rosa, N. Mex., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13	10	30	180	100	58	60	48	13	13	13
2	13	15	35	180	105	30	85	192	13	13	10
3	13	15	20	180	125	15	60	30	13	8	8
4	30	15	13	205	245	22	70	23	13	10	10
5	30	15	5	205	250	10	150	16	13	16	13
6	15	13	5	205	200	15	440	10	13	16	13
7	15	13	5	175	160	15	200	6	13	16	13
8	15	13	5	200	125	20	100	9	13	16	16
9	30	18	9	210	125	15	1,730	6	13	10	13
10	30	10	9	270	110	10	1,790	16	13	13	13
11	20	18	9	295	100	13	3,300	10	16	10	13
12	20	10	13	225	100	35	1,610	13	16	13	13
13	15	18	12	255	110	12	2,500	10	13	10	16
14	28	10	12	290	110	12	1,970	112	13	10	23
15	13	10	25	265	1,010	75	2,040	192	13	16	16
16	13	15	60	300	300	43	465	95	10	16	10
17	20	15	70	280	170	25	270	23	8	16	13
18	25	30	60	340	100	35	4,300	13	8	16	13
19	25	28	50	260	65	25	1,440	6	16	16	16
20	25	28	60	265	30	35	330	13	23	8	13
21	20	20	80	240	25	20	150	10	8	10	10
22	20	20	100	220	25	20	70	13	8	8	13
23	10	20	120	195	10	43	170	10	10	10	10
24	18	25	75	225	15	20	430	13	8	10	13
25	18	25	100	175	10	120	300	10	10	13	13
26	23	25	125	180	10	55	95	16	6	10	13
27	18	50	125	140	10	20	30	6	10	13	13
28	18	60	90	125	10	35	13	13	10	10	16
29	.....	48	125	130	170	43	13	70	6	16	16
30	.....	48	160	110	300	52	13	192	13	10	16
31	.....	40	.....	100	.....	35	39	.....	10	.....	10

NOTE.—These discharges were obtained as follows: Feb. 1–Aug. 8, indirect method for shifting channels; Aug. 9–Dec. 31, based on a rating curve which is fairly well defined; discharge interpolated for days when gage was not read.

Monthly discharge of Pecos River at Santa Rosa, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
February	30	13	19.8	1,100	B.
March	60	10	22.6	1,390	B.
April	160	5	53.6	3,190	B.
May	340	100	214	1,320	B.
June	1,010	10	141	8,390	B.
July	120	10	31.7	1,950	C.
August	4,300	13	782	48,100	D.
September	192	6	39.8	2,370	B.
October	23	6	11.8	726	D.
November	16	8	12.4	738	B.
December	23	8	13.3	818	B.
The period	.....	.....	.....	70,100	

PECOS RIVER NEAR FORT SUMNER, N. MEX.

The station, which was established on June 12, 1904, to determine the amount of water available for the Urton Lake project of the United States Reclamation Service, is located at a place known as Arenosa, about 12 miles northwest of old Fort Sumner, N. Mex., and 4 miles upstream from Fort Sumner, a station on the Belen cut-off of the Atchison, Topeka & Santa Fe Railway, and is near the

site of the proposed diversion dam and a few miles below Arroyo Salada. The nearest post office is Fort Sumner.

All the tributaries for a long distance above and below the station are intermittent in character and only occasionally carry large amounts of water. The drainage area above the station is about 5,300 square miles.

Some irrigation is practiced along the bottom lands at various localities above the station, but not enough to materially affect the flow of the stream. The proposed Urton Lake project will divert a considerable portion of the stream flow at this point.

Slush ice sometimes forms at this station, and thin ice forms along the edges of the river, but results are not greatly affected by the ice conditions.

On July 5, 1905, the station was moved downstream and a new rod gage established at the present datum. Otherwise there had been no change in datum.

On account of the extremely shifting character of the channel, it is impossible to make reliable estimates of discharge unless very frequent measurements are made. High-water measurements are made from a cable.

The station was discontinued February 28, 1910.

Discharge measurements of Pecos River near Fort Sumner, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 4	J. B. Stewart	68	51	2.75	139
Mar. 11	G. H. Russell	127	74	2.60	83

NOTE.—Measurements made by wading.

Daily gage height, in feet, and discharge, in second-feet, of Pecos River near Fort Sumner, N. Mex., for 1910.

[Observer, J. C. Pacheco.]

Day.	Jan.		Feb.		Day.	Jan.		Feb.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.5	20	2.6	66	16	2.4	15	2.65	220
2	2.5	20	2.6	67	17	2.6	52	2.8	380
3	2.4	11	2.6	68	18	2.6	53	2.85	480
4	2.6	39	2.7	105	19	2.6	55	2.75	380
5	2.6	40	2.7	110	20	2.6	56	2.7	345
6	2.6	41	2.6	80	21	2.6	57	2.7	370
7	2.5	24	2.6	85	22	2.7	85	2.7	395
8	2.8	105	2.7	140	23	2.6	58	2.6	300
9	3.3	600	2.6	100	24	2.7	90	2.6	320
10	3.4	750	2.65	135	25	2.6	60	2.65	400
11	2.75	90	2.7	185	26	2.6	60	2.6	380
12	2.6	46	2.65	160	27	2.6	61	2.6	410
13	2.5	27	2.65	175	28	2.6	62	2.6	435
14	2.6	45	2.65	190	29	2.6	63	.....	.....
15	2.5	30	2.7	245	30	2.6	64	.....	.....
					31	2.6	65	.....	.....

NOTE.—Daily discharges obtained by the indirect method for shifting channels.

Monthly discharge of Pecos River near Fort Sumner, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	750	11	91.7	5,640	C.
February	480	66	240	13,300	C.

PECOS RIVER NEAR DAYTON, N. MEX.

This station, which was established March 24, 1905, has been maintained in connection with the Carlsbad irrigation project in New Mexico to determine the amount of water supplied by the river to the McMillan reservoir, and is located about 3 miles east of Dayton, N. Mex., about 6 miles above the dam of the reservoir, and approximately 100 feet downstream from the mouth of Penasco River.

The original rod gage was washed out on September 6, 1905, and was relocated September 7, 1905, at a point about one-half mile upstream. Otherwise there has been no change in gage datum. Fair results can be obtained at this station if discharge measurements are taken at frequent intervals. This station was transferred March 31, 1908, to the United States Reclamation Service, and since then they have made the discharge measurements. Discharge measurements are made from a cable located about 100 yards below the new gage.

Considerable irrigation is practiced in the vicinity of Roswell, N. Mex., and opportunities for irrigation projects exist at various points above. The winters in this vicinity are comparatively mild and ice does not appreciably affect stream flow.

Discharge measurements of Pecos River near Dayton, N. Mex., in 1910.

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 11	3.6	258	June 18	4.7	1,080
Mar. 7	2.8	116	July 13	2.45	31.7
Apr. 1	2.5	82.6	Aug. 17	6.1	2,760
May 9	3.6	272	20	8.55	3,990
16	3.2	162	Sept. 7	3.3	204
23	3.4	187	Nov. 9	2.9	115
June 8	2.6	44.9	Dec. 8	3.5	234
15	2.5	41.6			

Daily gage height, in feet, of Pecos River near Dayton, N. Mex., for 1910.

[Eugene Lattion, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	3.4	3.0	2.5	2.7	2.8	3.3	2.4	3.3	2.4	2.8	3.5
2	4.0	3.4	3.0	2.5	2.7	2.7	3.2	2.4	4.5	2.5	2.8	3.4
3	3.8	3.4	3.0	2.4	2.6	2.7	3.0	2.4	3.8	2.8	2.8	3.4
4	3.7	3.4	2.9	2.4	2.6	2.7	3.0	2.5	3.4	2.7	2.7	3.4
5	3.7	3.5	2.8	2.4	2.8	2.6	3.0	2.5	3.3	2.6	2.8	3.4
6	3.7	3.6	2.8	2.4	3.4	2.6	3.0	2.5	3.2	2.5	2.8	3.5
7	3.7	3.6	2.8	2.4	3.5	2.6	2.8	3.0	3.1	2.6	2.95	3.5
8	3.4	3.6	2.8	2.4	3.6	3.0	2.7	3.9	3.0	2.6	2.9	3.5
9	3.6	3.6	2.7	2.6	3.6	3.0	2.7	4.1	3.0	2.5	2.9	3.5
10	3.6	3.5	2.7	2.6	3.6	3.1	2.6	4.2	2.9	2.5	2.9	3.5
11	3.7	3.6	2.7	2.6	3.4	2.9	2.5	4.3	2.8	2.5	2.9	3.5
12	3.7	3.6	2.7	2.6	3.4	2.7	2.4	4.0	2.7	2.5	2.9	3.5
13	3.7	3.6	2.8	2.6	3.3	2.7	2.45	6.0	2.7	2.5	3.0	3.5
14	4.1	3.6	2.8	2.5	3.2	2.7	2.6	8.4	2.8	2.5	3.0	3.5
15	4.3	3.6	2.8	2.5	3.2	2.5	2.8	9.8	2.9	2.5	3.0	3.5
16	4.1	3.6	2.8	2.5	3.2	2.4	2.5	7.3	2.9	2.6	3.1	3.5
17	3.8	3.6	2.8	2.7	3.2	2.4	2.6	5.8	3.1	2.6	3.1	3.5
18	3.7	3.6	2.8	2.7	3.2	4.7	2.6	4.7	3.1	2.6	3.1	3.6
19	3.7	3.6	2.9	2.6	3.4	4.5	2.5	10.2	3.0	2.6	3.1	3.6
20	3.6	3.6	2.8	2.6	3.7	3.9	2.5	8.55	3.1	2.6	3.3	3.6
21	3.6	3.5	2.8	2.6	4.0	3.7	2.4	6.3	3.0	2.6	3.3	3.6
22	3.8	3.4	2.8	2.5	3.6	3.5	2.4	5.2	3.0	2.6	3.3	3.55
23	3.7	3.3	2.8	2.4	3.4	3.2	2.4	4.6	2.8	2.7	3.4	3.5
24	3.7	3.3	2.8	2.3	3.2	3.2	2.4	4.0	2.8	2.7	3.4	3.5
25	3.4	3.4	2.8	2.4	3.2	3.2	2.4	3.7	2.7	2.7	3.4	3.6
26	3.4	3.4	2.8	2.4	3.1	3.0	2.4	3.5	2.5	2.7	3.2	3.6
27	3.5	3.3	2.8	2.4	3.2	3.0	2.4	3.4	2.5	2.7	3.2	3.6
28	3.5	3.2	2.6	2.4	3.2	3.0	2.4	3.4	2.5	2.9	3.4	3.6
29	3.4	.....	2.6	2.4	3.0	3.7	2.4	3.3	2.5	2.8	3.5	3.5
30	3.5	.....	2.6	2.4	2.1	3.7	2.4	3.3	2.4	2.8	3.4	3.5
31	3.5	.....	2.6	.....	2.1	.....	2.4	3.25	.....	2.8	.....	3.5

Daily discharge, in second-feet, of Pecos River near Dayton, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	207	135	82	100	74	159	70	130	74	110	230
2	420	207	135	82	100	67	139	72	540	82	110	207
3	320	207	135	74	91	64	109	74	260	110	110	207
4	285	207	122	74	91	61	104	76	175	100	100	207
5	285	230	110	74	110	52	99	79	165	91	110	207
6	285	255	110	74	207	50	93	82	165	82	110	230
7	285	255	110	74	230	48	68	135	150	91	128	230
8	207	255	110	74	255	68	62	390	135	91	122	230
9	255	255	100	91	255	66	57	500	135	82	122	230
10	255	230	100	91	255	71	48	576	122	82	122	230
11	285	255	100	91	207	57	39	654	110	82	122	230
12	285	255	100	91	207	45	33	490	100	82	122	230
13	285	255	110	91	186	44	32	2,390	100	82	135	230
14	475	255	110	82	167	43	35	6,500	110	82	135	230
15	590	255	110	82	167	42	46	8,350	122	82	135	230
16	475	255	110	82	167	55	37	4,580	122	91	150	230
17	320	255	110	100	162	75	40	2,400	150	91	150	230
18	285	255	110	100	160	1,080	41	700	150	91	150	255
19	285	255	122	91	195	895	39	9,100	135	91	150	255
20	255	255	110	91	276	462	40	3,990	150	91	186	255
21	255	230	110	91	388	358	49	1,280	135	91	186	255
22	320	207	110	82	240	276	50	510	135	91	186	242
23	285	186	110	74	187	188	52	292	110	100	207	230
24	285	186	110	67	150	185	54	165	110	100	207	230
25	207	207	110	74	148	182	56	130	100	100	207	255
26	207	207	110	74	129	143	58	115	82	100	167	255
27	230	186	110	74	138	139	60	110	82	100	167	255
28	230	167	91	74	132	136	62	112	82	122	207	255
29	207	.....	91	74	103	276	64	110	82	110	230	230
30	230	.....	91	74	40	260	66	113	74	110	207	230
31	230	.....	91	.....	38	.....	68	114	.....	110	.....	230

NOTE.—These discharges were computed by the United States Reclamation Service.

Monthly discharge of Pecos River near Dayton, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	590	207	298	18,300
February	255	167	230	12,800
March	135	91	109	6,700
April	100	67	81.6	4,860
May	388	38	170	10,500
June	1,080	42	185	11,000
July	159	32	63.2	3,890
August	9,100	70	1,430	87,900
September	540	74	141	8,390
October	122	74	93.3	5,740
November	230	100	151	8,980
December	255	207	234	14,400
The year	9,100	32	267	193,460

PECOS RIVER NEAR LAKEWOOD, N. MEX.

The station, which was established January 11, 1906, and transferred to the United States Reclamation Service March 31, 1908, is located 3 miles southeast of Lakewood and half a mile below the McMillan reservoir dam.

The present inclined rod gage was established May 8, 1906. It had been previously moved from its original location on February 8, 1906.

Fair results can be obtained at this station if occasional discharge measurements are made at different stages. Discharge measurements are made from a cable located about one-fourth mile above the railroad bridge of the Eastern Railway of New Mexico.

The following discharge measurement was made by the United States Reclamation Service:

August 20: Gage height, 8.4 feet; discharge, 3,810 second-feet.

Daily gage height, in feet, of Pecos River near Lakewood, N. Mex., for 1910.

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	2.8	.....	1.0	1.2	1.0	0.55	1.0	0.9	1.1
2	.....	2.1	.....	1.0	.....	1.0	.55	1.0	.9	1.1
3	.....	1.2	.....	1.1	.....	.8	.55	1.0	.9	1.1
4	.....	1.0	.....	1.2	.....	.8	.55	1.0	.9	1.1
5	.....	.....	.....	1.2	.....	.9	.55	1.0	.9	1.2
6	.....	1.7	.....	1.2	.....	.9	.75	1.0	.9	1.2
7	.....	1.7	.....	1.2	.....	1.0	.7	1.0	.9	1.2
8	.....	1.7	.....	1.2	.....	1.0	1.2	1.0	.9	1.2
9	.....	1.7	.....	1.2	.....	.8	1.5	1.0	.9	1.2
10	.....	1.0	.....	1.2	.....	.8	1.95	1.0	.9	1.2
11	.....	.....	.....	1.2	.....	.8	2.0	1.0	.9	1.2
12	.....	.....	.....	1.2	.....	.6	2.0	1.0	.9	1.2
13	.....	.....	.....	1.2	.....	.6	1.85	1.0	.9	1.2
14	.....	.....	.....	1.2	.....	.6	1.75	1.0	.9	1.3
15	.....	.....	.....	1.2	1.2	.6	2.15	1.0	.9	1.3
16	.....	.....	1.8	1.2	1.2	.6	4.7	1.0	.9	1.3
17	.....	.....	1.8	1.2	1.2	.6	6.4	1.0	.9	1.3
18	.....	.....	1.8	1.2	1.9	.65	7.2	1.0	.9	1.3
19	.....	.....	.8	1.2	2.2	.6	8.0	1.0	.9	1.3
20	.....	.....	.7	1.2	2.2	.6	8.4	1.0	.9	1.3
21	.....	.....	.7	1.2	2.2	.6	7.4	1.0	.9	1.3
22	.....	.....	.7	1.2	1.9	.35	7.4	1.0	.9	1.3
23	.....	.....	.7	1.2	1.7	.....	7.15	1.0	1.5	1.4
24	.....	.....	.7	1.2	1.5	.....	4.95	1.0	1.25	1.4
25	.....	.....	.7	1.2	1.35	.....	1.0	1.0	.8	1.4
26	.....	.....	.7	1.2	1.2	.8	1.0	1.0	.8	1.4
27	1.2	.....	.7	1.2	1.2	.65	1.0	1.0	.8	1.4
28	1.6	.....	.7	1.2	1.2	.5	1.0	1.0	.8	1.4
29	2.1	.....	.85	1.2	1.0	.55	1.0	1.0	1.0	1.4
30	2.7	.....	1.0	1.2	1.0	.55	1.0	1.0	1.1	.....
31	2.8	.....	.....	1.2	.....	.55	1.0	.....	1.05	.....

PECOS RIVER NEAR MOORHEAD, TEX.

The station, which was established by the International Boundary Commission in April, 1900, is near Moorhead, immediately above the high bridge of the Southern Pacific Railroad.

It is in the bottom of a canyon about 300 feet deep. Both banks of the stream are of rock, but the bottom is mud. The river here consists of a series of pools connected by rapids. The best pool was chosen for the station. Frequent discharge measurements are made to determine closely the daily discharge. The highest known flood occurred April 6, 1900, about two weeks before this gage was established. The water marks showed that it reached 35.75 feet on the gage.

The observations at this station during 1910 have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Pecos River near Moorhead, Tex., in 1910.

[By E. E. Winter and W. H. Dodd.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	703	0.9	328	July 8	569	0.2	189
7	705	.9	291	13	595	.15	174
11	711	.95	294	18	588	.1	170
15	709	.95	322	22	585	.1	169
20	695	.9	286	29	586	.1	167
25	692	.9	315	Aug. 3	581	.1	172
29	703	.9	299	8	552	.1	177
Feb. 3	696	.9	312	12	585	.1	172
8	687	.7	250	17	595	.1	170
12	685	.7	263	21	579	.1	165
16	703	.8	313	25	610	.35	243
21	665	.75	309	29	914	2.5	1,432
26	670	.7	305	Sept. 3	706	1.0	366
Mar. 3	677	.7	263	8	826	1.6	731
8	655	.7	248	12	663	.2	233
12	674	.7	270	16	672	.5	274
16	673	.6	263	20	589	.05	188
21	643	.5	251	24	588	.0	180
25	636	.5	247	28	640	.3	242
29	676	.5	258	Oct. 3	743	1.2	471
Apr. 4	708	.95	343	7	731	1.0	432
8	673	.6	266	11	668	.5	281
12	688	.9	291	15	684	.6	298
16	678	.75	279	20	692	.6	298
21	645	.5	231	24	689	.6	297
24	643	.5	242	29	687	.6	303
28	656	.5	248	Nov. 3	734	1.2	464
May 4	660	.5	262	7	714	1.0	450
9	641	.4	232	11	673	.5	254
13	656	.4	233	15	685	.7	265
17	636	.4	240	19	676	.6	270
21	745	1.1	487	23	666	.5	221
25	653	.45	246	28	645	.45	211
31	652	.45	248	Dec. 3	650	.5	234
June 4	656	.5	223	8	648	.45	230
7	644	.45	200	12	628	.45	213
11	643	.45	190	16	648	.5	220
16	650	.2	210	20	645	.5	224
21	634	.2	182	24	645	.5	227
24	601	.15	155	29	639	.5	262
July 3	608	.15	184				

Daily gage height, in feet, of Pecos River near Moorhead, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.0	0.95	0.7	0.6	0.5	0.45	0.15	0.1	1.55	1.3	0.65	0.45
2	.95	.95	.7	.6	.5	.45	.15	.1	1.2	1.3	.8	.5
3	.9	.9	.7	.65	.5	.45	.15	.1	1.0	1.15	1.1	.5
4	.95	.9	.65	.95	.5	.5	.15	.1	.9	3.3	1.15	.5
5	.9	.9	.65	.9	.5	.5	.15	.1	.75	1.95	1.0	.5
6	.9	.85	.7	.85	.5	.5	.15	.1	19.6	1.65	1.0	.5
7	.9	.8	.7	.65	.5	.45	.2	.1	2.45	1.0	1.0	.5
8	.9	.75	.7	.6	.5	.45	.2	.1	1.65	1.0	.95	.45
9	.95	.7	.7	.65	.55	.45	.2	.1	1.4	.95	.7	.45
10	.95	.7	.7	.95	.55	.45	.15	.1	.95	.8	.55	.45
11	.95	.7	.75	.9	.55	.45	.15	.1	.7	.5	.5	.45
12	.95	.7	.7	.9	.55	.35	.15	.1	.25	.4	.55	.45
13	.95	.95	.7	.85	.4	.35	.15	.1	.1	.5	.65	.5
14	.95	.95	.65	.8	.4	.25	.15	.1	.8	.55	.7	.5
15	.95	.9	.6	.8	.4	.2	.15	.1	.65	.6	.7	.5
16	.95	.8	.6	.75	.4	.2	.15	.1	.4	.6	.7	.5
17	.95	.8	.6	.7	.4	.2	.1	.1	.1	.6	.65	.5
18	.9	.7	.5	.6	.4	.2	.1	.05	.1	.6	.6	.5
19	.9	.7	.5	.6	.45	.2	.1	.05	.1	.6	.6	.5
20	.9	.7	.5	.5	.65	.2	.1	.1	.05	.6	.6	.5
21	.9	.75	.5	.5	1.0	.2	.1	.1	.05	.6	.6	.5
22	.9	.75	.5	.5	.95	.2	.1	.1	.05	.6	.5	.5
23	.95	.9	.5	.5	.65	.2	.1	.3	.0	.6	.5	.5
24	.95	.8	.5	.5	.5	.15	.1	.6	.0	.6	.5	.5
25	.9	.8	.5	.5	.5	.15	.1	.35	.0	.6	.5	.5
26	.9	.7	.5	.55	.45	.15	.1	1.25	.0	.6	.45	.5
27	.9	.7	.5	.5	.45	.15	.1	2.4	.1	.6	.45	.5
28	.9	.7	.5	.5	.45	.15	.1	2.7	.25	.6	.45	.5
29	.9	.....	.5	.5	.4	.15	.1	2.6	.95	.6	.45	.5
30	.9	.....	.5	.5	.45	.15	.1	2.45	1.5	.6	.45	.5
31	.9	.....	.6	.....	.45	.15	.1	1.85	.....	.6	.....	.5

Daily discharge, in second-feet, of Pecos River near Moorhead, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	395	320	290	280	255	240	160	165	845	550	320	210
2	360	325	275	280	255	230	170	170	540	550	360	235
3	a330	a310	a265	290	260	220	a185	a170	a365	a430	a440	a235
4	340	310	250	a345	a260	a225	180	175	340	1,790	460	235
5	310	310	245	330	260	225	175	175	300	995	450	235
6	300	295	255	320	260	225	170	175	26,000	815	450	235
7	a290	280	250	275	260	a200	190	175	1,410	a430	a450	235
8	285	a265	a250	a265	260	200	a190	a175	a770	430	430	a230
9	305	255	255	275	a275	195	190	175	660	415	335	225
10	300	255	260	295	275	195	175	175	495	370	275	220
11	a295	260	275	290	275	a190	175	175	405	a280	a255	220
12	300	a265	a270	a290	275	185	175	a175	a245	265	255	a215
13	310	345	270	285	a235	200	a175	170	220	280	265	220
14	315	350	265	285	235	195	175	170	315	290	265	220
15	a320	340	265	285	235	200	175	170	295	a300	a265	220
16	320	a315	a265	a280	240	a210	175	170	a255	300	270	a220
17	315	315	265	270	a240	200	170	a170	200	300	270	220
18	295	295	250	250	240	195	a170	155	200	300	265	220
19	290	295	250	250	255	190	170	155	200	300	a270	225
20	a285	300	250	230	325	185	170	165	a190	a300	265	a225
21	290	a310	a250	a230	a450	a180	165	a165	190	300	255	225
22	300	310	250	235	430	175	a165	165	190	300	230	225
23	325	340	250	240	320	170	165	225	180	295	a220	225
24	330	320	250	a240	265	a155	165	320	a180	a295	220	a225
25	a315	325	a245	245	a265	155	165	a245	180	300	220	235
26	310	a305	250	255	245	155	165	740	180	300	210	240
27	305	305	255	245	245	150	165	1,370	200	300	210	250
28	305	305	255	a250	245	150	165	1,530	a230	300	a210	255
29	a300	.....	a260	250	230	150	a165	a1,480	490	a305	210	a260
30	300	.....	260	250	245	150	165	1,410	700	305	210	260
31	300	.....	280	.....	a250	.....	165	1,110	.....	305	.....	260

a Date of measurement.

Monthly discharge of Pecos River near Moorhead, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	395	285	311	19,121
February	350	255	304	16,909
March	290	245	259	15,917
April	345	230	270	16,086
May	450	230	270	16,592
June	240	150	190	11,296
July	190	160	172	10,572
August	1,530	155	392	24,129
September	26,000	180	1,232	73,329
October	1,790	265	419	25,775
November	460	210	294	17,474
December	260	210	231	14,202
The year	26,000	150	361	261,402

GALLINAS RIVER NEAR LAS VEGAS, N. MEX.

The station, which was established August 13, 1903, and maintained primarily for the purpose of determining the amount of water available for diversion and storage in the San Guyjella Basin about 6 miles northwest of Las Vegas, is located at Las Vegas Hot Springs, 6 miles above Las Vegas, N. Mex.

The altitude of the station is about 6,700 feet. It is below all perennial tributaries. The drainage area above the station is about 90 square miles; the total drainage area exceeds 600 square miles.

Very little water is diverted above the station, though practically all of the ordinary flow is used for irrigation in the valley below. The reservoir mentioned above has a capacity of about 40,000 acre-feet, and is to be used for the irrigation of 10,000 acres of land. It will be filled from the Gallinas, the Sapello, and other small streams in that vicinity. The flow of the stream at this point is not usually affected by it.

The gage was washed out on September 29, 1904, and replaced by the present rod gage on October 19, 1904, which is located about 600 feet above the foot-bridge at the power house, from which high discharge measurements are made. Lower water measurements are made by wading. The zero of the new rod gage is 0.71 foot lower than that of the old one. Results at this station have been fairly satisfactory.

Discharge measurements of Gallinas River near Las Vegas, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 5	G. H. Russell	19	11	1.75	3.5
Mar. 6	do	20.5	14.4	1.85	8.4
Apr. 24	J. B. Stewart	28	26	2.20	40
Aug. 31	W. W. Mills	18.2	5.6	1.7	1.8
Oct. 22	G. H. Russell			1.6	*a*.25
Nov. 29	do	18.5	11.4	1.77	4.3
Dec. 1	C. B. Digby			1.6	*a*.25

a Discharge estimated.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Gallinas River near Las Vegas, N. Mex., for 1910.

[William Prager, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.7	1.8	1.8	1.9	2.2	1.8	1.7	1 8	1.9	.....	1.6	1.6
2	1. 8	1.8	1.8	1.9	2.2	1.8	1.7	1 75	1. 85	1.6	1.6	1.6
3	1. 9	1.8	1.8	1.9	2.2	1.75	1.7	1.7	1.75	1.6	1.6	1.6
4	1. 9	1.8	1.85	1.95	2.2	1.7	1.65	1.7	1.7	1.6	1.6	1.6
5	1.75	1.8	1.9	2.0	2.1	1.7	1.65	1.75	1.7	1.6	1.6	1.6
6	1.7	1.8	1.9	1.95	2.1	1.7	1.7	1.85	1.7	1.6	1.6	1.6
7	1.7	1.8	2.0	1.9	2.1	1.7	1.6	1.75	1.7	1.6	1.6	1.6
8	1.8	1.8	2.05	2.0	2.1	1.7	1.65	1.9	1.7	1.6	1.6	1.6
9	1.8	1.8	2.05	2.0	2.1	1.7	1.65	1.8	1.6	1.6	1.6	1.6
10	1.8	1.8	2.15	2.0	2.1	1.7	1.7	2.1	1.85	1.6	1.6	1.6
11	1.8	1.8	2.1	2.0	2.1	1.7	1.65	2.3	1.7	1.6	1.6	1.6
12	1.8	1.8	2.25	2.15	2.1	1.7	1.7	2.15	1.6	1.6	1.6	1.6
13	1.8	1.8	2.05	2.2	2.1	1.7	2.2	2.15	1.6	1.6	1.6	1.6
14	1.8	1.7	2.1	2.2	2.1	1.7	2.0	2.0	1.65	1.6	1.6	1.6
15	1.8	1.7	2.3	2.2	2.1	1.85	1.85	2.05	1.8	1.6	1.6	1.6
16	1.8	1.7	2.25	2.15	2.1	1.8	1.8	2.0	1.7	1.6	1.6	1.6
17	1.8	1.7	2.15	2.1	2.05	1.75	1.8	2.0	1.65	1.6	1.6	1.6
18	1.8	1.7	2.1	2.15	2.0	1.7	1.75	2.05	1.6	1.6	1.6	1.6
19	1.8	1.7	1.95	2.2	1.95	1.7	1.7	1.95	1.6	1.65	1.6	1.6
20	1.8	1.75	2.0	2.2	2.0	1.7	1.75	1.9	1.6	1.65	1.6	1.6
21	1.8	1.8	2.0	2.2	1.9	1.7	1.85	1.9	1.7	1.6	1.6	1.6
22	1.8	1.8	2.0	2.2	1.9	1.6	1.85	1.85	1.8	1.6	1.6	1.6
23	1.8	1.8	2.0	2.2	1.9	1.6	1.7	1.9	1.7	1.6	1.6	1.6
24	1.8	1.8	2.0	2.2	1.9	1.6	1.7	1.85	1.7	1.6	1.6	1.6
25	1.8	1.8	2.0	2.2	1.9	1.6	1.7	1.8	1.7	1.6	1.6	1.6
26	1.8	1.8	2.0	2.2	1.85	1.6	1.7	1.75	1.7	1.6	1.6	1.6
27	1.8	1.8	2.0	2.2	1.8	1.6	1.8	1.75	1.7	1.6	1.6	1.6
28	1.8	1.8	2.0	2.2	1.8	1.6	1.7	1.7	1.65	1.6	1.6	1.6
29	1.8	.....	1.95	2.2	1.8	1.7	1.8	1.7	1.6	1.6	1.6	1.6
30	1.8	.....	1.9	2.2	1.8	1.7	1.8	1.7	1.6	1.6	1.6	1.6
31	1.8	.....	1.9	.....	1.8	.....	1.9	1.7	.....	1.6	.....	1.6

Daily discharge, in second-feet, of Gallinas River near Las Vegas, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	5.0	5.0	10.5	41	5.0	1.8	5.0	10.5	0.3	0.3	0.3
2	5.0	5.0	5.0	10.5	41	5.0	1.8	3.4	7.8	.3	.3	.3
3	10.5	5.0	5.0	10.5	41	3.4	1.8	1.8	3.4	.3	.3	.3
4	10.5	5.0	7.8	14.8	41	1.8	1.0	1.8	1.8	.3	.3	.3
5	3.4	5.0	10.5	19	29	1.8	1.0	3.4	1.8	.3	.3	.3
6	1.8	5.0	10.5	14.8	29	1.8	1.8	7.8	1.8	.3	.3	.3
7	1.8	5.0	19	10.5	29	1.8	.3	3.4	1.8	.3	.3	.3
8	5.0	5.0	24	19	29	1.8	1.0	10.5	1.8	.3	.3	.3
9	5.0	5.0	24	19	29	1.8	1.0	5.0	.3	.3	.3	.3
10	5.0	5.0	35	19	29	1.8	1.8	29	7.8	.3	.3	.3
11	5.0	5.0	29	19	29	1.8	1.0	55	1.8	.3	.3	.3
12	5.0	5.0	48	35	29	1.8	1.8	35	.3	.3	.3	.3
13	5.0	5.0	24	41	29	1.8	41	35	.3	.3	.3	.3
14	5.0	1.8	29	41	29	1.8	19	19	1.0	.3	.3	.3
15	5.0	1.8	55	41	29	7.8	7.8	24	5.0	.3	.3	.3
16	5.0	1.8	48	35	29	5.0	5.0	19	1.8	.3	.3	.3
17	5.0	1.8	35	29	24	3.4	5.0	19	1.0	.3	.3	.3
18	5.0	1.8	29	35	19	1.8	3.4	24	.3	.3	.3	.3
19	5.0	1.8	14.8	41	14.8	1.8	1.8	14.8	.3	1.0	.3	.3
20	5.0	3.4	19	41	19	1.8	3.4	10.5	.3	1.0	.3	.3
21	5.0	5.0	19	41	10.5	1.8	7.8	10.5	1.8	.3	.3	.3
22	5.0	5.0	19	41	10.5	.3	7.8	7.8	5.0	.3	.3	.3
23	5.0	5.0	19	41	10.5	.3	1.8	10.5	1.8	.3	.3	.3
24	5.0	5.0	19	41	10.5	.3	1.8	7.8	1.8	.3	.3	.3
25	5.0	5.0	19	41	10.5	.3	1.8	5.0	1.8	.3	.3	.3
26	5.0	5.0	19	41	7.8	.3	1.8	3.4	1.8	.3	.3	.3
27	5.0	5.0	19	41	5.0	.3	5.0	3.4	1.8	.3	.3	.3
28	5.0	5.0	19	41	5.0	.3	1.8	1.8	1.0	.3	.3	.3
29	5.0	.....	14.8	41	5.0	1.8	5.0	1.8	.3	.3	.3	.3
30	5.0	.....	10.5	41	5.0	1.8	5.0	1.8	.3	.3	.3	.3
31	5.0	.....	10.5	.....	5.0	.....	10.5	1.8	.....	.3	.....	.3

NOTE.—These discharges are based on a rating curve which is fairly well defined below 160 second-feet.

Monthly discharge of Gallinas River near Las Vegas, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	10.5	1.8	4.99	307	B.
February	5.0	1.8	4.26	237	B.
March	55	5.0	21.4	1,320	A.
April	41	10.5	30.5	1,810	A.
May	41	5.0	21.8	1,340	A.
June	7.8	.3	2.07	123	B.
July	41	.3	4.92	303	A.
August	55	1.8	12.3	756	A.
September	10.5	.3	2.28	136	B.
October	1.0	.3	.32	19.7	C.
November	.3	.3	.30	17.9	C.
December	.3	.3	.30	18.4	C.
The year	55	.3	8.83	6,390	

RIO HONDO BASIN.

RIO RUIDOSO NEAR GLENCOE, N. MEX.

Rio Ruidoso rises on the eastern slopes of the Sierra Blanca in the western part of Lincoln County, N. Mex., and takes a general easterly course to its junction with Rio Hondo about 6 miles below San Patricio.

The gaging station, which was established August 17, 1910, is located 2½ miles above Glencoe post office and about 2 miles above Eagle Creek. Numerous small ditches divert water for irrigation for about 16 miles above the station. Glencoe is about 50 miles east of Tularosa, and 12 miles south of Capitan, the nearest railroad point.

An inclined rod gage is fastened to the right bank about 50 yards above the forest ranger station.

Discharge measurements of Rio Ruidoso near Glencoe, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 17	W. B. Freeman	8.8	8.1	1.48	7.6
Nov. 26	J. B. Stewart	10	6.7	1.50	6.6

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rio Ruidoso near Glencoe, N. Mex., for 1910.

[R. L. Bateman, observer.]

Day.	Aug.	Oct.	Nov.	Dec.	Day.	Aug.	Oct.	Nov.	Dec.
1				1.45	16				1.5
2				1.5	17	1.5		1.5	1.5
3				1.5	18	1.9		1.5	1.5
4			1.6	1.5	19	1.6		1.5	1.5
5			1.6	1.5	20	1.55	1.45	1.5	1.5
6			1.6		21		1.45	1.5	1.5
7			1.5		22			1.5	1.5
8			1.5	1.5	23			1.5	
9			1.6	1.5	24			1.5	
10			1.55	1.5	25		1.45		
11			1.5	1.5	26		1.5	1.5	
12			1.5	1.5	27		1.5	1.5	1.5
13			1.5		28			1.5	1.5
14			1.5	1.5	29			1.5	1.5
15			1.55	1.5	30		1.5	1.5	1.6
					31		1.5		1.45

PENASCO RIVER BASIN.

PENASCO RIVER AT ELK, N. MEX.

Penasco River rises in the Sacramento Mountains and originally flowed 40 miles as a fair-sized brook, then, entering a strip of marshy land 10 to 12 miles long, disappeared. There was practically no connection between the upper and lower Penasco, the latter beginning in a series of springs about 12 miles from the Pecos. About 20 years ago a cattle company cut a ditch between the upper and lower Penasco, uniting the two streams.

The gaging station, which was established August 15, 1910, is located in sec. 5, T. 16 S., R. 16 E., about 200 yards below Elk post office. It is about one-half mile above the mouth of Elk Canyon. Many small irrigation ditches divert water for 30 miles above the station.

The rod gage established August 15 was destroyed by a flood on September 1, and on November 25 a chain gage was established at a different datum.

Discharge measurements of Penasco River at Elk, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 15	W. B. Freeman	19	21	1.62	29.7
Nov. 25	J. B. Stewart	20	12	1.85	22.4

NOTE.—Gage heights of measurements are referred to different datums.

Daily gage height, in feet, of Penasco River at Elk, N. Mex., for 1910.

[J. R. Plowman, observer.]

Day.	Aug.	Day.	Aug.	Day.	Aug.
1		11		21	2.1
2		12		22	2.1
3		13		23	2.3
4		14		24	2.1
5		15	1.62	25	2.1
6		16	1.65	26	2.05
7		17	[a] 4.3	27	2.05
8		18		28	
9		19	[b]	29	2.05
10		20	2.2	30	2.1
				31	3.6

[a] Gage washed out at 4.30 p. m.; approximate height, 6.5 feet.
[b] Gage replaced by observer at same location; datum unknown.

DEVILS RIVER BASIN.

DEVILS RIVER AT DEVILS RIVER, TEX.

This station, which was established in April, 1900, by the International Boundary Commission, is opposite the Southern Pacific Railroad station at Devils River.

The river is about 50 miles long, has a perennial flow, and during flood periods is subject to great fluctuations. No good location for a gaging station exists on this stream where it would be accessible from the railroad station. The right bank is the talus of a cliff, the left bank is a bottom heavily timbered. At the site chosen the bed of the stream is nearly all a rock ledge, but so seamed and faulted as to be very rough. The current changes in such a way as to give materially different discharges for the same gage height. It is therefore necessary to make frequent measurements to determine closely the daily flow.

The highest water on record occurred April 6, 1900, about two weeks before this gage was established. It reached a height of 25.4 feet on the gage, but this is 8 feet higher than any other known flood. Low water is 2 feet on the gage.

The observations at this station during 1910 have been made under the direction of the United States section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements of Devils River at Devils River, Tex., in 1910.

[By E. E. Winter and W. H. Dodd.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 4	314	2.2	426	July 14	294	2.2	415
12	321	2.2	427	19	293	2.2	424
21	306	2.2	394	25	293	2.2	395
26	310	2.2	411	30	293	2.2	393
30	306	2.2	391	Aug. 4	293	2.2	400
Feb. 4	297	2.15	409	9	292	2.2	388
14	304	2.15	415	14	292	2.2	392
17	304	2.15	392	26	320	2.3	457
23	301	2.15	388	30	292	2.2	407
27	300	2.15	384	Sept. 4	292	2.2	398
Mar. 9	296	2.15	382	9	439	2.7	803
13	297	2.15	390	17	349	2.4	598
22	295	2.15	384	25	320	2.3	495
26	294	2.15	381	29	320	2.3	510
30	290	2.1	374	Oct. 4	349	2.4	599
Apr. 5	305	2.2	398	12	349	2.4	576
13	339	2.3	497	17	320	2.3	514
18	336	2.3	504	25	320	2.3	495
25	334	2.25	461	30	292	2.2	402
29	330	2.25	453	Nov. 4	292	2.2	403
May 5	328	2.25	429	12	292	2.2	409
10	311	2.15	404	16	292	2.2	402
22	426	2.55	712	25	292	2.15	385
29	320	2.3	516	29	292	2.15	383
June 3	320	2.3	420	Dec. 4	293	2.15	373
8	317	2.3	433	13	292	2.15	375
13	298	2.25	417	18	293	2.2	396
22	301	2.2	418	26	293	2.2	388
29	311	2.25	483	30	292	2.2	382
July 9	292	2.2	400				

Daily gage height, in feet, of Devils River at Devils River, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	2.15	2.15	2.35	2.3	2.3	2.25	2.2	2.2	2.3	2.2	2.15
2	2.2	2.15	2.15	2.2	2.25	2.3	2.25	2.2	2.2	2.3	2.2	2.15
3	2.2	2.15	2.15	2.2	2.25	2.3	2.25	2.2	2.2	2.45	2.2	2.15
4	2.2	2.15	2.15	2.2	2.25	2.3	2.25	2.2	2.2	2.4	2.2	2.15
5	2.2	2.15	2.15	2.2	2.25	2.3	2.25	2.15	2.2	2.65	2.2	2.15
6	2.2	2.15	2.15	2.2	2.15	2.3	2.25	2.15	2.2	2.55	2.2	2.15
7	2.2	2.15	2.15	2.2	2.15	2.3	2.2	2.2	6.3	2.45	2.2	2.15
8	2.2	2.15	2.15	2.2	2.15	2.3	2.2	2.2	4.25	2.4	2.2	2.15
9	2.2	2.15	2.15	4.75	2.15	2.3	2.2	2.2	2.85	2.4	2.2	2.15
10	2.2	2.15	2.15	2.35	2.15	2.25	2.2	2.2	2.65	2.4	2.2	2.15
11	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.55	2.4	2.2	2.15
12	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.5	2.4	2.2	2.15
13	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.45	2.4	2.2	2.15
14	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.4	2.4	2.2	2.2
15	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.4	2.4	2.2	2.2
16	2.2	2.15	2.15	2.3	2.15	2.25	2.2	2.2	2.4	2.35	2.2	2.2
17	2.2	2.15	2.15	2.3	2.2	2.2	2.2	2.2	2.4	2.3	2.15	2.2
18	2.2	2.15	2.15	2.3	2.3	2.2	2.2	2.2	2.4	2.3	2.15	2.2
19	2.2	2.15	2.15	2.3	4.8	2.2	2.2	2.2	2.35	2.3	2.15	2.2
20	2.2	2.15	2.15	2.3	7.95	2.2	2.2	2.2	2.35	2.3	2.15	2.2
21	2.2	2.15	2.15	2.3	3.95	2.2	2.2	2.2	2.3	2.3	2.15	2.2
22	2.2	2.15	2.15	2.3	2.8	2.2	2.2	2.2	2.3	2.3	2.15	2.2
23	2.2	2.15	2.15	2.3	2.5	2.2	2.2	2.2	2.3	2.3	2.15	2.2
24	2.2	2.15	2.15	2.25	2.5	2.2	2.2	2.2	2.3	2.3	2.15	2.2
25	2.2	2.15	2.15	2.25	2.45	2.2	2.2	2.2	2.3	2.3	2.15	2.2
26	2.2	2.15	2.15	2.25	2.4	2.35	2.2	2.3	2.3	2.3	2.15	2.2
27	2.2	2.15	2.15	2.25	2.4	2.3	2.2	2.25	2.3	2.25	2.15	2.2
28	2.2	2.15	2.1	2.25	2.35	2.3	2.2	2.3	2.3	2.25	2.15	2.2
29	2.2	.....	2.1	2.25	2.3	2.25	2.2	2.25	2.3	2.2	2.15	2.2
30	2.2	.....	2.1	2.25	2.3	2.25	2.2	2.2	2.3	2.2	2.15	2.2
31	2.2	.....	2.3	.....	2.3	.....	2.2	2.2	.....	2.2	.....	2.2

Daily discharge, in second-feet, of Devils River at Devils River, Tex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	405	395	385	470	470	480	475	395	405	515	400	380
2	410	400	385	400	435	450	470	395	400	525	400	380
3	420	405	385	400	435	a420	465	400	400	620	405	375
4	a425	a410	385	400	430	425	460	a400	a400	a600	a405	a375
5	425	410	385	a400	a430	425	455	380	400	745	405	375
6	425	410	385	400	405	430	445	375	400	685	405	375
7	425	410	385	400	405	430	400	395	6,550	620	405	375
8	425	410	380	400	405	a435	400	390	3,280	585	405	375
9	425	415	a380	3,820	405	435	a400	a390	a1,040	585	410	375
10	425	415	380	540	a405	420	405	390	770	580	410	375
11	425	415	385	495	405	420	405	390	715	580	410	375
12	a425	415	385	495	405	415	410	390	680	a575	a410	375
13	425	415	a390	a495	405	a415	410	390	650	575	405	a375
14	425	a415	390	500	405	420	a415	a390	620	570	405	390
15	420	405	390	500	405	420	415	395	610	570	405	390
16	415	400	390	500	405	420	420	400	605	545	a400	395
17	410	a390	385	505	435	410	420	400	a600	a515	390	395
18	410	390	385	a505	460	410	425	405	590	510	390	a395
19	405	390	385	505	3,900	415	a425	405	560	510	390	395
20	400	390	385	500	11,000	415	420	410	550	510	390	395
21	a395	390	385	500	2,690	420	410	415	520	505	385	395
22	395	390	a385	500	a1,060	a420	405	415	515	505	385	390
23	400	a390	385	500	670	425	400	420	505	500	385	390
24	405	390	385	460	670	430	a395	420	500	495	385	390
25	410	385	380	a460	630	435	395	425	a495	a495	a385	390
26	a410	385	a380	460	590	530	395	a460	500	490	385	a390
27	405	385	380	460	590	505	395	435	505	450	385	385
28	400	a385	375	455	555	510	395	445	505	445	385	385
29	395	.....	375	a455	a515	a485	395	425	510	405	a385	380
30	a390	.....	a375	455	515	485	a395	a405	510	a400	385	a380
31	390	.....	440	.....	515	.....	395	405	.....	400	.....	380

a Date of measurement.

Monthly discharge of Devils River at Devils River, Tex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	425	390	412	25,319
February	415	385	400	22,225
March	440	375	385	23,702
April	3,820	400	578	34,383
May	11,000	405	1,015	62,380
June	530	410	438	26,093
July	475	395	417	25,617
August	460	375	405	24,902
September	6,550	400	843	50,162
October	745	400	536	32,945
November	410	385	396	23,593
December	395	375	384	23,594
The year	11,000	375	518	375,000

RIO SALADO BASIN.

RIO SALADO NEAR GUERRERO, TAMAULIPAS, MEXICO.

The Salado is a torrential stream, entering the Rio Grande from the Mexican side about 60 miles below Laredo, or 730 miles by river below El Paso. The town of Guerrero is located on the Salado some 4 miles above its mouth, and the gaging station is 2 miles

above the town. The gaging station was established in 1900 by the International Boundary Commission.

The river is a series of pools and rapids. The best pool available was chosen for the station. The banks are sandy clay, not subject to erosion. The bottom is mud. In low water the river is measured by wading among the rocks below the station. Frequent discharge measurements are made to determine closely the daily flow. The highest recorded flood, on June 16, 1903, gave 17.7 on the gage.

The observations at this station have been made under the direction of the Mexican section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements and gage heights for the years 1900 to 1904, which had not hitherto been published by the United States Geological Survey, are given in Water-Supply Paper 248.

Discharge measurements of Rio Salado near Guerrero, Tamaulipas, Mexico, in 1910.

[By M. G. Garcia.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	2,493	2.9	593	June 23	168	1.9	162
7	2,492	2.9	590	28	151	1.1	95
11	2,468	2.8	550	July 3	132	.6	65
15	2,470	2.8	551	7	129	.5	54
19	2,490	2.9	609	11	129	.4	50
23	2,467	2.8	546	15	127	.3	48
28	2,441	2.7	495	19	125	.1	35
Feb. 3	2,420	2.6	454	23	124	.1	35
7	173	2.4	144	28	105	.0	29
11	172	2.4	145	Aug. 3	87	— .2	19
15	173	2.4	149	7	87	— .3	16
19	170	2.3	136	Sept. 1	2,936	5.2	1,995
23	171	2.3	139	2	4,021	10.0	10,994
27	171	2.3	135	6	2,439	2.9	583
Mar. 3	171	2.2	121	10	2,418	2.8	541
7	169	2.2	123	13	4,155	10.2	12,199
11	168	2.1	116	16	5,402	15.6	26,407
15	171	2.1	102	18	5,136	14.7	22,595
19	178	2.5	177	22	3,428	6.7	4,058
22	2,942	4.8	1,512	27	3,184	5.5	1,993
26	2,682	3.5	849	Oct. 3	3,019	4.8	1,412
30	2,459	2.6	470	7	3,040	4.9	1,452
Apr. 3	174	2.4	146	11	2,849	4.0	1,099
7	169	2.3	123	15	2,819	3.9	1,037
11	169	2.1	103	19	2,768	3.7	979
15	2,505	2.8	556	23	2,731	3.5	878
19	176	2.5	162	28	2,701	3.4	792
23	154	1.9	117	Nov. 3	2,655	3.2	731
28	149	1.4	95	7	2,651	3.2	725
May 3	146	1.3	90	11	2,607	3.0	674
7	144	1.3	89	15	2,582	2.9	637
11	143	1.2	78	19	2,578	2.9	625
13	144	1.2	76	23	2,554	2.8	579
19	157	1.9	112	28	2,552	2.8	578
23	149	1.5	99	Dec. 3	2,526	2.7	534
24	2,482	2.7	527	7	2,521	2.7	532
28	153	1.6	103	11	2,518	2.7	523
June 3	140	1.1	72	15	2,493	2.6	457
7	3,722	8.7	8,907	19	2,546	2.8	566
11	2,478	3.0	576	23	2,519	2.7	506
15	164	1.9	158	28	2,515	2.7	500
19	159	1.5	123				

Daily gage height, in feet, of Rio Salado near Guerrero, Tamaulipas, Mexico, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.9	2.6	2.2	2.4	1.4	1.3	0.8	−0.1	7.1	5.1	3.3	2.7
2	2.9	2.6	2.2	2.4	1.4	1.2	.7	− .2	9.35	5.0	3.3	2.7
3	2.9	2.6	2.2	2.4	1.3	1.1	.6	− .2	6.0	4.8	3.2	2.7
4	2.9	2.5	2.2	2.4	1.3	1.0	.6	− .2	4.1	4.9	3.2	2.7
5	2.9	2.5	2.2	2.3	1.3	1.0	.5	− .2	3.2	4.8	3.2	2.7
6	2.9	2.5	2.2	2.3	1.3	4.65	.5	− .3	2.8	5.25	3.2	2.7
7	2.9	2.4	2.2	2.25	1.3	7.85	.5	.3	2.4	4.75	3.2	2.7
8	2.9	2.4	2.2	2.2	1.45	4.7	.5	− .4	2.05	4.4	3.1	2.7
9	2.8	2.4	2.1	2.2	1.3	3.55	.4	− .4	1.85	4.2	3.1	2.7
10	2.8	2.4	2.1	2.1	1.3	3.3	.4	.....	2.75	4.1	3.1	2.7
11	2.8	2.4	2.1	2.1	1.2	2.95	.4	.....	2.1	4.0	3.0	2.7
12	2.8	2.4	2.1	2.3	1.2	2.7	.4	.....	2.1	4.0	3.0	2.7
13	2.8	2.4	2.1	2.2	1.2	2.3	.3	.....	3.3	4.0	3.0	2.7
14	2.8	2.4	2.1	2.9	1.2	2.05	.3	.....	6.7	3.9	3.0	2.7
15	2.9	2.4	2.1	2.8	1.6	1.9	.3	.....	10.8	3.9	2.9	2.6
16	2.9	2.4	2.1	2.7	2.05	1.8	.2	.....	15.8	3.8	2.9	2.8
17	2.9	2.4	2.1	2.6	2.0	1.7	.2	.....	15.0	3.8	2.9	2.8
18	2.9	2.4	2.1	2.6	1.9	1.6	.2	.....	14.25	3.8	2.9	2.8
19	2.8	2.3	2.9	2.5	1.85	1.5	.1	.....	12.65	3.7	2.9	2.8
20	2.8	2.3	2.9	2.35	1.65	1.4	.1	.....	7.85	3.7	2.9	2.8
21	2.8	2.3	3.0	2.15	1.45	1.3	.1	.....	7.0	3.6	2.8	2.8
22	2.8	2.3	5.4	1.95	1.85	1.7	.1	.....	6.5	3.5	2.8	2.8
23	2.8	2.3	4.95	1.9	2.05	1.85	.1	.....	6.15	3.5	2.8	2.7
24	2.8	2.3	3.85	1.8	2.85	1.65	.1	.....	5.95	3.4	2.8	2.7
25	2.7	2.3	3.65	1.7	2.4	1.45	.0	.....	5.75	3.4	2.8	2.7
26	2.7	2.3	3.35	1.6	1.95	1.3	.0	.....	5.65	3.4	2.8	2.7
27	2.7	2.3	2.95	1.5	1.7	1.2	.0	.....	5.5	3.4	2.8	2.7
28	2.7	2.2	2.75	1.4	1.6	1.1	.0	.....	5.4	3.4	2.8	2.7
29	2.7	.....	2.6	1.4	1.6	1.0	− .1	.....	5.3	3.3	2.8	2.7
30	2.6	.....	2.6	1.4	1.5	.9	− .1	.....	5.2	3.3	2.7	2.7
31	2.6	.....	2.5	.....	1.4	.....	− .1	.....	.....	3.3	.....	2.7

NOTE.—No flow Aug. 10 to 31.

RIO SAN JUAN BASIN.

RIO SAN JUAN NEAR SANTA ROSALIA RANCH, TAMAULIPAS, MEXICO.

The San Juan is a long torrential stream entering the Rio Grande 15 miles below Roma and 790 miles by river below El Paso. Six miles above its mouth is the town of Camargo.

The station was first established in 1900 near La Quemada, 12 miles above Camargo, by the International Boundary Commission, but in time of heavy flood in the Rio Grande backwater reached the station, and on July 14, 1902, it was moved 6 miles farther upstream to its present location near Santa Rosalia ranch, Tamaulipas, Mexico. It is now above backwater.

The river bed at both stations shifts constantly and frequent discharge measurements have been made to determine closely the daily flow. Both banks are of sandy clay which are above high water and do not erode. The bottom of the river is sand which erodes slightly in flood.

Low water (no flow) was approximately zero on the gage prior to the flood of 1909, which swept away the station here. The channel was either scoured out at this time or the restored gage has not the

same datum as the old. No flow is now −8.5 on the gage. The highest recorded flood, on September 16, 1904, reached 27 feet on the gage.

The observations at both stations have been made under the direction of the Mexican section of the International Water Commission (prior to July 1, 1910, International Boundary Commission).

Discharge measurements and gage heights, 1900 to 1904, which had not hitherto been published by the United States Geological Survey, are given in Water-Supply Paper 248.

Discharge measurements of Rio San Juan near Santa Rosalia ranch, Tamaulipas, Mexico, in 1910.

[By S. Jaso.]

Date.	Area of section.	Gage height.	Discharge.	Date.	Area of section.	Gage height.	Discharge.
	Sq. ft.	*Feet.*	*Sec.-ft.*		*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 3	1,558	−2.1	577	July 7	868	− 6.65	30
7	1,510	−2.4	529	12	787	− 7.0	27
11	1,504	−2.4	532	16	739	− 7.7	26
17	1,527	−2.35	621	20	731	− 7.8	25
23	1,461	−2.8	446	23	1,064	− 4.7	300
28	1,438	−3.4	315	28	789	− 7.0	27
Feb. 5	1,383	−3.5	275	Aug. 2	732	− 7.8	26
12	1,348	−3.9	256	7	698	− 8.2	24
16	1,317	−4.1	225	11	681	− 8.3	24
19	1,234	−4.5	154	16	665	− 8.3	24
23	1,259	−4.5	148	20	663	− 8.4	23
27	1,180	−5.0	99	24	650	− 8.4	22
Mar. 3	1,119	−5.1	70	28	622	− 8.5	0
7	1,161	−5.2	41	Sept. 1	3.192	15.5	10,342
11	1,121	−5.4	39	2	3,085	15.0	9,995
16	1,108	−5.5	39	3	1,367	7.0	2,768
21	1,158	−5.1	71	4	1,832	.9	1,545
22	1,658	− .95	750	7	1,084	− 3.6	434
24	1,543	−2.4	620	10	1,305	− 1.95	1,154
28	1,263	−4.4	173	15	3,192	15.5	10,342
Apr. 1	1,806	− .2	1,162	17	4,454	23.0	18.039
2	1,640	−1.15	908	19	1,334	6.5	3,598
6	1,443	−2.65	508	28	2,759	− 2.5	2,867
10	1,150	−4.4	332	Oct. 3	2,987	5.1	3,079
14	1,155	−5.2	40	10	2,176	2.9	1,822
18	1,102	−5.8	40	14	2,131	2.7	1,622
22	1,083	−6.3	39	18	2,019	2.0	1,476
27	941	−6.5	33	22	1,821	1.6	971
May 5	934	−7.0	33	25	1,716	1.3	833
7	883	−7.1	31	29	2,347	3.3	2,209
11	854	−7.0	31	Nov. 2	2.046	1.45	1,057
16	849	−7.0	30	7	1,776	.9	867
20	1,946	.65	1,954	11	1,645	.7	655
24	1,174	−4.55	337	15	1,550	.4	597
28	1,044	−5.9	37	19	1,492	.3	597
June 3	886	−6.7	31	23	1,486	.2	553
7	1,512	−1.45	1,208	28	1,481	.0	481
11	1,037	−5.6	37	Dec. 3	1,456	− .2	449
16	1,027	−5.7	35	7	1,448	− .3	396
21	836	−6.9	29	12	1,454	− .2	431
25	793	−7.1	28	16	1,494	.0	561
26	1,102	−4.35	331	20	1,488	.0	499
28	1,192	−4.05	427	24	1.439	− .3	404
July 3	841	−7.0	29	28	1.417	− .4	389

Daily gage height, in feet, of Rio San Juan near Santa Rosalia ranch, Tamaulipas, Mexico, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	−2.0	−3.3	−5.1	0.3	−6.6	−6.6	−6.5	−7.55	11.45	−2.65	1.55	−0.15
2	−2.1	−3.35	−5.1	−1.45	−6.75	−6.6	−6.9	−7.85	13.1	−3.8	1.45	− .2
3	−2.15	−3.4	−5.1	−3.2	−6.8	−6.7	−7.05	−8.0	5.55	−2.9	1.35	− .2
4	−2.3	−3.5	−5.15	2.6	−7.0	−6.7	−7.2	−8.05	.1	3.5	1.15	− .2
5	−2.3	−3.55	−5.2	2.3	−7.0	−6.8	−7.3	−8.1	− 1.75	2.0	1.05	− .1
6	−2.4	−3.65	−5.2	−2.95	−7.0	−6.8	−7.4	−8.15	− 3.0	− .5	.95	− .2
7	−2.4	−3.75	−5.2	−3.75	−7.1	−3.65	−5.9	−8.2	− 3.75	−4.15	.85	− .3
8	−2.4	−3.85	−5.3	−4.25	−7.1	−1.3	−5.5	−8.3	− 4.2	−6.75	.8	− .3
9	−2.4	−3.9	−5.3	−4.4	−6.75	−2.8	−6.2	−8.3	− 4.55	−7.0	.8	− .25
10	−2.4	−3.9	−5.4	−4.4	−6.95	−4.55	−6.6	−8.3	− 1.9	−8.4	.8	− .2
11	−2.4	−3.9	−5.4	−4.45	−7.0	−5.75	−6.85	−8.3	− 1.1	3.45	.7	− .2
12	−2.4	−3.9	−5.4	−4.3	−7.0	−6.1	−7.05	−8.3	− 3.55	3.15	.6	− .2
13	−2.4	−4.0	−5.5	−4.8	−7.0	−6.3	−7.2	−8.3	1.2	2.95	.5	− .3
14	−2.4	−4.0	−5.5	−5.2	−7.1	−6.5	−7.35	−8.3	5.75	2.7	.5	− .3
15	−2.4	−4.0	−5.5	−5.3	−7.1	−4.8	−7.65	−8.3	11.35	2.55	.4	− .2
16	−2.35	−4.1	−5.5	−5.4	−7.0	−5.8	−7.7	−8.3	23.0	2.4	.3	.1
17	−2.4	−4.15	−5.5	−5.5	−7.1	−6.05	−7.7	−8.4	22.5	2.15	.3	.2
18	−2.4	−4.25	−5.5	−5.9	−7.1	−6.3	−7.8	−8.4	15.25	2.0	.3	.1
19	−2.5	−4.35	−5.2	−6.2	−3.85	−6.6	−7.8	−8.4	5.25	2.0	.3	.05
20	−2.6	−4.4	−5.1	−6.3	−0.45	−6.7	−7.8	−8.4	2.7	1.85	.3	.0
21	−2.7	−4.5	−3.0	−6.3	−2.4	−6.9	−7.8	−8.4	1.2	1.65	.3	− .1
22	−2.7	−4.5	−1.4	−6.3	−3.65	−7.05	−7.1	−8.4	.95	1.6	.3	− .1
23	−2.8	−4.5	−2.65	−6.3	−4.2	−6.7	−4.85	−8.4	1.0	1.5	.2	− .2
24	−2.85	−4.6	−2.75	−6.4	−4.6	−7.1	−5.9	−8.4	1.3	1.4	.2	− .3
25	−2.95	−4.75	−3.45	−6.4	−4.85	−3.8	−6.3	−8.4	− .75	1.3	.1	− .3
26	−3.15	−4.95	−3.9	−6.4	−5.1	−2.65	−6.7	−8.4	− 1.35	1.3	.1	− .3
27	−3.3	−5.0	−4.25	−6.5	−5.6	−3.65	−6.9	−8.4	− 1.9	1.45	.0	− .3
28	−3.4	−5.0	−4.4	−6.5	−5.95	−4.45	−7.05	.....	− 2.6	1.55	.0	− .4
29	−3.2	.....	−4.5	−6.5	−6.05	−5.6	−7.25	.....	− 3.5	3.6	− .1	− .4
30	−3.2	.....	−4.6	−6.6	−6.3	−6.1	−7.3	.....	− 4.1	2.55	− .1	− .5
31	−3.3	.....	−3.25	.....	−6.5	.....	−7.4	.....	.....	1.7	.....	− .5

NOTE.—No flow Aug. 28 to 31.

MISCELLANEOUS MEASUREMENTS IN WESTERN GULF OF MEXICO DRAINAGE BASINS.

The following miscellaneous discharge measurements were made in the western Gulf of Mexico drainage basins in 1910:

Miscellaneous measurements in western Gulf of Mexico drainage basins in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Dec. —	Hancock Spring	Lampasas River	Lampasas, Tex.		7.4
—	Hanna Spring	....do	....do		.9
Aug. —	Barton Springs	Colorado River (of Texas).	Austin, Tex.		19
	San Marcos River	Guadalupe River	San Marcos, Tex.		95
Sept. —	San Antonio River	Gulf of Mexico	San Antonio, Tex.		18
13	Leona River	Nueces River	Uvalde, Tex.		8.4
12	Rio Grande	Gulf of Mexico	Above mouth of Clear Creek, Colo.		85
21	.....do	.....do	Below headgate of Rio Grande canal, Colo.		262
21	.....do	.....do	¼ mile below Farmers' Union canal, Colo.		166
21	.....do	.....do	Headgate, Prairie canal, Colo.		112
20	.....do	.....do	Monte Vista, Colo.		63.8
20	.....do	.....do	6 miles below Monte Vista, Colo.		12.1
20	.....do	.....do	12 miles below Monte Vista, Colo.		18.8

Miscellaneous measurements in western Gulf of Mexico drainage basin in 1910—Contd.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept. 20	Rio Grande	Gulf of Mexico	5 miles above Alamosa, Colo.		6.6
Aug. 16	do	do	Alamosa, Colo.		13
Sept. 25	do	do	do		9.4
14	do	do	Above mouth of Rio Alamosa, Colo.		10.8
14	do	do	Above mouth of Rio La Jara, Colo.		11.7
15	do	do	Above mouth of Conejos River, Colo.		14.8
14	do	do	Above mouth of Rio Trinchera, Colo.		15.6
15	do	do	5 miles below La Sauces, Colo.		46.2
16	do	do	2 miles above bridge, Lobatos, Colo.		41
16	do	do	Colorado-New Mexico State line.		41
July 8	Crooked Creek	Rio Grande	Sec. 31, T. 41 N., R. 2 W., Colorado.		[a] 1.2
2	Clear Creek	do	Sec. 32, T. 41 N., R. 2 W., above ditches, near Texas Club House, Colorado.		83.5
12	South Fork of Clear Creek.	Clear Creek	2 miles above mouth in sec. 13 T., 41 N., R. 3 W., Colorado.		4.0
20	Trout Creek	Rio Grande	Sec. 4, T. 39 N., R. 3 E., Colorado.		12
13	do	do	Above ditches, sec. 24, T. 40 N., R. 2 W., Colorado.		27.6
13	Bear Creek	Trout Creek	Sec. 24, T. 40 N., R. 2 W., Colorado.		.8
13	Red Mountain Creek	Rio Grande	Near county bridge, sec. 18, T. 40 N., R. 1 W., Colorado.		28.6
3	Shallow Creek	do	Above ditches, sec. 4, T. 41 N., R. 14 W., Colorado.		8.9
3	do	do	Sec. 10, T. 41 N., R. 1 W., Colorado.		3.3
6	Miners Creek	do	Sec. 2, T. 41 N., R. 1 W., Colorado.		26.5
15	Willow Creek	do	In flume above Creede, sec. 30, T. 42 N., R. 1 E., Colorado.		18.2
7	Bellows Creek	do	Sec. 13, T. 41 N., R. 1 E., Colorado.		31.5
7	do	do	500 feet above mouth, sec. 14, T. 41 N., R. 1 E., Colorado.		23.6
1	Goose Creek	do	1,000 feet above mouth, sec. 35, T. 41 N., R. 1 E., Colorado.		79.6
Sept. 23	do	do	do		22
Oct. 20	do	do	do		21
July 13	Deer Creek	Goose Creek	Sec. 35, T. 41 N., R. 1 E., Colorado.		1.0
19	Elk Creek	Rio Grande	Below all ditches, T. 40 N., R. 3 E., Colorado.		[a] .4
19	Alder Creek	do	1,000 feet above ditches, sec. 27, T. 40 N., R. 3 E., Colorado.		5.1
Aug. 1	Willow Creek	do	Below all ditches, sec. 35, T. 40 N., R. 3 E., Colorado.		3.1
3	Embargo Creek	do	Sec. 33, T. 41 N., R. 4 E., Colorado.		[a] 10.0
6	do	do	Below irrigation, sec. 23, T. 40 N., R. 4 E., Colorado.		8.4
July 27	Los Pinos Creek	do	Below irrigation, sec. 26, T. 40 N., R. 5 E., Colorado.		[a] 2.0
22	San Francisco Creek	do	Above all ditches, T. 39 N., R. 6 E., Colorado.		[a] 1.0
Aug. 17	Rock Creek	do	Sec. 32, T. 38 N., R. 7 E., Colorado.		[a] 7
Sept. 3	Spring Creek	Rock Creek	Below Sheridan's ditches, T. 37 N., R. 7 E., Colorado.		[a] 10
8	Cotton Creek	San Luis Creek	At mouth, near Mirage, Colo.		[b]
Oct. 7	do	do	do		2
7	Wild Cherry Creek	do	At mouth, near Medano Springs, Colo.		[b]
7	Rito Alto Creek	do	At mouth, near Moffat, Colo.		[b]
7	San Isabel Creek	do	At mouth, near San Isabel, Colo.		[c] 5
5	Carnero Creek	do	¼ mile above Devil's Gate, near La Garita, Colo.		5.0

[a] Float measurement. [b] Stream dry. [c] Estimated.

Miscellaneous measurements in western Gulf of Mexico drainage basins in 1910—Contd.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 8	Carnero Creek	San Luis Creek	At Devil's Gate near La Garita, sec. 25, T. 42 N., R. 6 E., Colorado.		2.8
Sept. 2	do	do	At stage road, between Del Norte and Saguache, 1½ miles NW. of La Garita, Colo.		.8
Oct. 7	do	do	At mouth, near Bismark post-office, Colo.		(*a*)
Aug. 25	La Garita Creek	do	Sec. 6, T. 41 N., R. 6 E., Colorado.		5.1
Sept. 2	do	do	3 miles SW. of La Garita post office on stage road between Del Norte and Saguache, Colo.		.8
Oct. 5	do	do	do		4.4
Sept. 10	Rito Arenas Creek		At King's ranch, near Liberty, Colo.		6.6
9	Deadman Creek	Rito Arenas Creek	Liberty, Colo.		1.0
Oct. 17	Rio Alamosa	Rio Grande	Above Nordland ditch, sec. 7, T. 35 N., R. 8 E., Colorado.		*b* 2
Sept. 26	do	do	Near Capulin, Colo.		8.2
Aug. 9	do	do	At mouth near Alamosa, Colo.		(*a*)
Sept. 24	do	do	do		(*a*)
28	do	do	do		(*a*)
Oct. 17	Rio La Jara	do	T. 34 N., R. 6 E., Colorado		*b* 15
Aug. 15	do	do	Hansen's ranch, above mouth, near Alamosa, Colo.		61
17	do	do	do		52
Sept. 28	do	do	do		4.4
Oct. 17	do	do	do		11.4
Sept. 14	do	do	At mouth, near Alamosa, Colo.		3.1
Sept. 17	Rio Trinchera	do	T. 31 S., R. 71 W., Colorado		9.9
18	do	do	Head of Trinchera Canal, sec. 2, T. 31 S., R. 72 W., Colorado.		6
18	do	do	Head of Pat Breen ditch, sec. 2, T. 31 S., R. 73 W., Colorado.		(*a*)
Oct. 4	do	do	½ mile above mouth sec. 24, T. 31 S., R. 75 W., Colorado.		*b* 1.0
Sept. 14	do	do	At mouth, near Alamosa, Colo.		(*a*)
29	do	do	do		(*a*)
16	Ute Creek	Rio Trinchera	Below White's ranch, T. 29 S., R. 72 W., Colorado.		6.9
15	Sangre de Cristo Creek	Ute Creek	T. 30 S., R. 71 W., Colorado		*b* 1.0
15	Conejos River	Rio Grande	At Austin's ranch near mouth, near La Jara, Colo.		24
28	do	do	do		25
Oct. 17	do	do	do		34
13	San Antonio River	Conejos River	At wagon bridge ¼ mile east of Lobatos, Colo.		0
Apr. 2	do	do	Highway bridge, 1 mile south of Antonito, Colo.		*c* 40
May 26	do	do	do	*d* 13.0	197
Sept. 9	Culebra River	Rio Grande	Above forks, sec. 36, T. 3N., R. 71 W., Colorado.		15.3
14	do	do	Castilla Estates Development Co. gaging station, sec. 27, T. 3 N., R. 72 W., Colorado.		31.3
12	Torcido Creek	Rio Culebra	Mouth of canyon, T. 1 N., R. 71 W., Colorado.		*b* .1
13	Ventero Creek	do	3 miles above Sanchez dam, sec. 1, T. 1 N., R. 72 W., Colorado.		.75
10	Joroso Creek	Ventero Creek	T. 1 N., R. 71 W., Colorado		*b* 2.5
10	Vallejo Creek	Rio Culebra	1 mile below sawmill, T. 2 N., R. 71 W., Colorado.		*b* 7.0
8	Pozo Creek	do	T. 3 N., R. 71 W., Colorado		9.9
Apr. 9	Costilla Creek	Rio Grande	At wagon bridge, about 1 mile east of Eastdale, Colo.	2.18	32

a Stream dry.
b Float measurement.
c Estimated.
d Distance from reference mark (cross painted at foot of truss post, 33 feet from right abutment, downstream side of bridge) to water surface.

Miscellaneous measurements in western Gulf of Mexico drainage basins in 1910—Contd.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 13	Costilla Creek	Rio Grande	At Antonito-Questa road crossing, about 4 miles from the Rio Grande, New Mexico.		0
Sept. 13	Latir Creek	....do	4 miles above Cerro, N. Mex., and 8 miles above Questa, N. Mex.		4.8
Oct. 13	....do	....do	At Antonita-Questa road crossing near Questa, N. Mex.		*a* 3
Sept. 13	Colorado Creek	....do	About 4 miles above Questa, N. Mex.	*b* 3.55	21
13	Cabresta Creek	Colorado Creek	Above all ditches, 4 miles above Questa, N. Mex.	*b* 2.25	6
13	....do	....do	At mouth, 4 miles above Questa, N. Mex.		*a* .5
Oct. 15	Arroyo Seco	Arroyo Hondo	Wagon bridge in Arroyo Seco, Colo., near mouth.		*a* 1.0
May 12	Rio Pueblo de Taos	Rio Grande	About 2 miles above Pueblo de Taos, N. Mex.		28
Mar. 12	Rio Lucero	Rio Pueblo de Taos.	About 9 miles above Taos, N. Mex.		11
30	Rio Santa Cruz	Rio Grande	About ¼ mile above Santa Cruz, N. Mex.		32
16	Rio Quemado	Rio Santa Cruz	At mouth of canyon, 1½ miles above Cordova, N. Mex.	.43	6.3
Aug. 13	Rio Fresnal	Rio La Luz	At mouth, near La Luz, N. Mex.		*a* 6.3
Mar. 6	Pecos River	Rio Grande	500 feet below footbridge at Pecos, N. Mex.	*d* 3.00	72
Feb. 3	....do	....do	Below Canyon Pintada and 6 miles below Santa Rosa, N. Mex.		95
June 9	Willow Creek	Pecos River	At mouth, at Cowles, N. Mex.		*a* 2
Apr. 23	Holy Ghost Creek	....do	600 feet above mouth, below Cowles, N. Mex.	*e* 2.35	15
June 9	....do	....do	At mouth, below Cowles, N. Mex.		*a* 8
Apr. 23	Indian Creek	....do	....do	*f* 3.65	2.8
June 9	....do	....do	....do		*a* .5
Nov. 1	....do	....do	....do		*a* .5
Apr. 23	El Macho Creek	....do	....do	*g* 4.45	9.7
June 9	....do	....do	....do		0
Apr. 23	Dalton Creek	....do	At mouth, above Pecos, N. Mex.	*h* 5.30	10.7
June 9	....do	....do	....do		0
Oct. 21	Salado Creek	Gallinas River	At railroad crossing, north of Las Vegas, N. Mex.		*a* .75
Feb. 3	Agua Negra Chiquita	Pecos River	¾ mile above mouth, near Santa Rosa, N. Mex.		33
Mar. 13	....do	....do	50 feet below road bridge, near Santa Rosa, N. Mex.		29
Aug. 18	Canyon Pintada *i*	....do	At railroad bridge, Pintada, N. Mex.		*a* 20
19	....do	....do	....do		*a* 4
20	....do	....do	....do		0
Feb. 3	....do	....do	At mouth, 5 miles below Santa Rosa, N. Mex.		29
Aug. 17	Rio Bonito	Hondo River	¼ mile below Fort Stanton, N. Mex.		*a* .25
17	Salado Creek	Rio Bonito	2 miles below Capitan, N. Mex.		*a* 8
17	....do	....do	....do		0

a Estimated.
b Distance from reference mark to water surface.
c Stream dry.
d Distance from reference mark (on left side of bridge) to water surface.
e Distance from reference mark (on rock on left bank 5 feet above abandoned bridge) to water surface
f Distance from reference mark (a nail on downstream side of bridge) to water surface.
g Distance from reference mark (on rock on left bank, about 500 feet above mouth) to water surface.
h Distance from reference mark (on rock on left bank about 225 feet above mouth) to water surface.
i There have been several floods on this stream during the past 10 days. High-water marks of recent date indicate a flood flow of around 1,000 second-feet. The Pintada Reservoir, 1½ miles below the El Paso & Southwestern Railroad bridge, has water in it for the first time since it was built about 3 years ago. On Aug. 19 at 3 p. m., reservoir gage read 16.5 feet. It is stated that on Aug. 16 or 17 gage reading was about 20.0 feet. From the map it is estimated that when gage read 16.5 there were about 570 acre-feet in reservoir, and J. L. Campbell, engineer in charge of maintenance of way El Paso & Southwestern Railroad, states that the run-off from Pintada Canyon up to the latter part of August, 1910, had just filled the reservoir, the capacity being 1,300 acre-feet.

Miscellaneous measurements in western Gulf of Mexico drainage basins in 1910—Contd.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 15	Felix River	Pecos River	At Spur ranch, 2 miles west of the east boundary of Mescalero-Apache Indian Reservation.		0
15	Lincoln Canyon	Felix River	Sec. 32, T. 13 S., R. 17 W., New Mexico.		*a* .25
15	do	do	do		0
16	do	do	do		0
Mar. 26	Upper Penasco River	Pecos River	At falls, 1 mile below Box Canyon, N. Mex.		15
Apr. 14	Penasco River	do	½ mile below Peter's ranch, 5 miles below Mayhill, N. Mex		54
Mar. 23	do	do	Below springs at Cleve's ranch, 4 miles below Elk, N. Mex.		32
23	do	do	Laramore ranch, New Mexico.		37
23	do	do	Head of Hope ditch, near Hope, N. Mex.		23
22	do	do	At railroad crossing, New Mexico.		31
Aug. 14	James Canyon	Penasco River	2 miles east of Cloudcroft, N. Mex.		0
14	do	do	At mouth, near Mayhill, N. Mex.		25
14	Chiquito Creek	do	At mouth, 3 miles above Elk, N. Mex.		0
Aug. 15	Elk Canyon	do	At mouth, near Elk, N. Mex.		*a* .5
Sept. —	San Felipe Creek	Rio Grande	Del Rio, Tex		70
—	Las Moras Creek	do	Brackettville, Tex		14

a Estimated.

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 289

SURFACE WATER SUPPLY OF THE UNITED STATES

1910

PART IX. COLORADO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. FREEMAN, E. C. LA RUE
AND H. D. PADGETT

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SURFACE WATER SUPPLY OF COLORADO RIVER BASIN, 1910.

By W. B. Freeman, E. C. La Rue, and H. D. Padgett.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> *Provided*, That this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor are they inclusive of all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years, and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the Survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country, and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	Pacific coast in California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A.=Annual Report; B.=Bulletin; W S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
W S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A., pt. 4	Monthly discharge (also for many earlier years)	1898.
W S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt. 4	Monthly discharge	1900.
W S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W S. 75	Monthly discharge	1901.
W S. 82 to 85	Complete data	1902.
W S. 97 to 100	do	1903.
W S. 124 to 135	do	1904.
W S. 165 to 178	do	1905.
W S. 201 to 214	Complete data, except descriptions	1906.
W S. 241 to 252	Complete data	1907–8.
W S. 261 to 272	do	1909.
W S. 281 to 292	do	1910.

NOTE.—No data regarding stream flow are given in the fifteenth and seventeenth annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1910. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899 [a]	1900 [b]	1901	1902	1903
Atlantic coast and eastern Gulf of Mexico:					
New England rivers	35	47	65, 75	82	97
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97
Susquehanna River to York River, inclusive	35	48	65, 75	82	97
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98
Santee River to Pearl River, inclusive	36	48	65, 75	83	98
St. Lawrence River	36	49	65, 75	(82), 83	97
Hudson Bay			66, 75	85	100
Mississippi River:					
Ohio River	36	48, (49)	65, 75	83	98
Upper Mississippi River	36	49	65, 75	83	98, (99)
Missouri River	(36), 37	49, (50)	66, 75	84	99
Lower Mississippi River	37	50	{ (65), 66, 75 }	(83), 84	(98), 99
Western Gulf of Mexico	37	50	66, 75	84	99
Pacific coast and Great Basin:					
Colorado River	(37), 38	50	66, 75	85	100
Great Basin	38, (39)	51	66, 75	85	100
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100
North Pacific coast	38	51	66, 75	85	100

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing results of stream measurements, 1899–1910 — Continued.

	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:						
New England rivers	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	125	166	202	241	261	281
Susquehanna River to York River, inclusive	126	167	203	241	261	281
James River to Yadkin River, inclusive	126	167	203	242	262	282
Santee River to Pearl River, inclusive	127	168	204	242	262	282
St. Lawrence River	129	170	206	244	264	284
Hudson Bay	130	171	207	245	265	285
Mississippi River:						
Ohio River	128	169	205	243	263	283
Upper Mississippi River	128, (130)	171	207	245	265	285
Missouri River	130, (131)	172	208	246	266	286
Lower Mississippi River	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	132	174	210	248	268	288
Pacific coast and Great Basin:						
Colorado River	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289, (291)
Great Basin	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290
South Pacific coast to Klamath River, inclusive	134	177	213	251	271	291
North Pacific coast	135	(177), 178	214	252	272	292

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.
291		

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the

main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records in each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-feet, feet per square mile, and run-off in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96.0 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-feet.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11} = \text{net horsepower on water wheel realizing 80 per cent of theoretical power.}$

EXPLANATION OF DATA.

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data, so far as available, are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the result of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

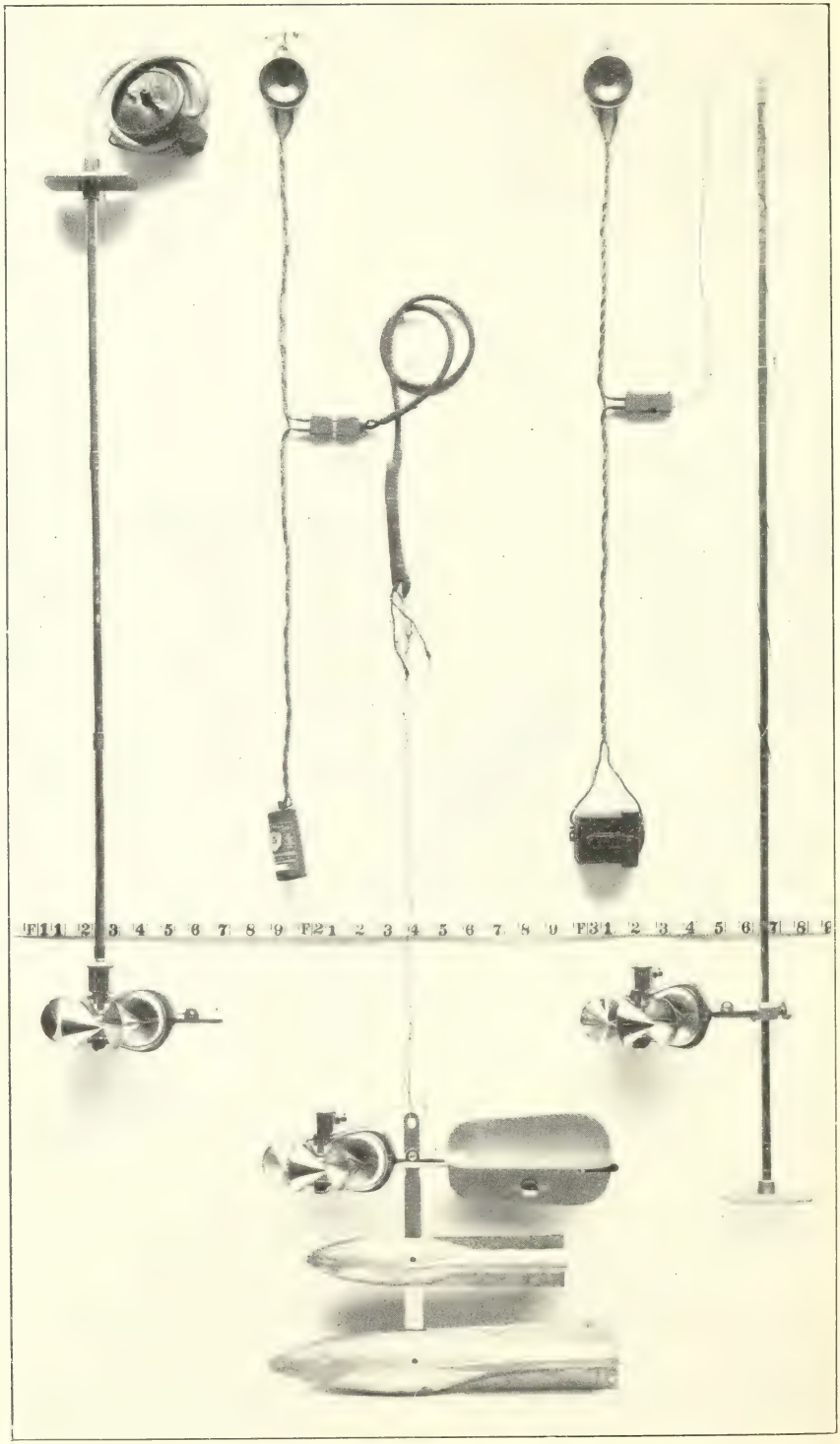
The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be made by scaling off the discharge in second-feet for each tenth of a foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater periods.

The table of daily discharge gives the discharge in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined in page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations and Plate II shows the various types of current meters [1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream-flow data depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation between discharge and stage.

Errors of the second class are due, first, to errors in observation of stage; second, to errors in measurements of flow; and, third, to errors due to misinterpretation of stage and flow data.

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions the observers perform their work honestly. The records are, however, closely watched, and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the

monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

In general, the base data which are collected in the field each year by the survey engineers are published, not only to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. Records clearly worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate

information regarding stream flow at the particular localities. The survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

COOPERATION AND ACKNOWLEDGMENTS.

Special acknowledgments as follows are due for records furnished:

The United States Indian Office for the maintenance of stations on the Uinta Reservation in the vicinity of the Uinta irrigation survey.

The United States Reclamation Service, for data in the Gunnison River basin in Colorado, the Strawberry River drainage basin in Utah, the Santa Cruz [1] and Salt River basins in Arizona, and for the maintenance of the station on Grand River at Palisades, Colo.

The United States Forest Service, for cooperation on stations in the Colorado River basin or near the forest reserves.

The Territory of New Mexico, through the Territorial engineer, Mr. Vernon L. Sullivan, for cooperation in the maintenance of all stations in the Colorado River basin in New Mexico.

The Atchison, Topeka & Santa Fe Railway, through Mr. Vernon L. Sullivan, for cooperation in maintenance of stations in Colorado River basin in New Mexico.

The State engineer of Colorado, Mr. C. W. Comstock, for cooperation in the maintenance of certain stations in the Grand River basin; also for data, furnished complete for publication in this water-supply paper, obtained in the Green, Grand, and San Juan drainage basins in Colorado by his hydrographers independently of the United States Geological Survey.

The State of Utah, through Mr. Caleb Tanner, State engineer, for cooperation in maintenance of stations in the Colorado River basin in Utah.

Mr. Thomas Lyons, of Gila, N. Mex., for cooperation in the maintenance of the station on the Gila at Redrock and for other assistance in the work.

Mr. R. E. Vickery, of Grand Junction, Colo., for cooperation in the maintenance of the stations on West Divide and West Mamm creeks.

The Central Colorado Power Co., for cooperation on the maintenance of stations in the Grand River basin.

Assistance was rendered or records furnished by the United States Weather Bureau, the Denver Reservoir & Irrigation Co., Mr. G. H. Matthes, Mr. E. C. Jensen, Mr. Stanley Krajicek, Mr. Jay Turley, Mr. G. W. Vallery, the Socorro Mines Co., Mr. H. F. Robinson, Mr. R. I. Meeker, the Green River Irrigation Co., Mr. H. W. Sheley, the Beardsley Irrigation Co., and other companies and individuals.

[1] The data for the Santa Cruz at Tucson, Ariz., were obtained from the Reclamation Service, but the station is maintained by the University of Arizona.

DIVISION OF WORK.

The field data in the Colorado River basin in Colorado were collected under the direction of W. B. Freeman, district engineer, assisted by James B. Stewart, G. H. Russell, George J. Lyon, S. T. Harding, and E. O. Christiansen.

The field data in the Colorado River basin in Utah and western Wyoming for 1910 were collected under the direction of E. C. La Rue, district engineer, assisted by G. C. Baldwin, E. S. Fuller, A. B. Purton, G. H. Canfield, and J. C. Dort.

The field data in the Duchesne River basin in Utah were collected under the direction of W. B. Freeman, district engineer, assisted by R. H. Fletcher, who was under the more immediate supervision of H. C. Means, superintendent of irrigation, United States Indian Office.

The field data for the San Juan and Gila River basins in New Mexico were collected under the general direction of W. B. Freeman, district engineer, assisted by James B. Stewart, G. H. Russell, and George J. Lyons. This work was done in cooperation with Vernon L. Sullivan, Territorial engineer, assisted by C. D. Miller.

The field data for all stations in Arizona have been collected under the direction of W. B. Clapp, district engineer, by C. C. Jacob.

Rating curves and special estimates were made by W. B. Freeman, E. C. La Rue, O. W. Hartwell, J. B. Stewart, G. C. Stevens, and H. D. Padgett. The completed data were prepared for publication by H. D. Padgett. Computations were made by H. D. Padgett, J. B. Stewart, J. J. Phelan, and M. E. McChristie.

The report has been edited by Mrs. B. D. Wood.

GAGING STATIONS IN COLORADO RIVER BASIN.

The following is a list of gaging stations maintained in the Colorado River basin by the United States Geological Survey and cooperators. The stations are arranged by river basins, in downstream order, as explained on page 11, tributaries being indicated by indention. Data for these stations have been published in the reports listed in tables on pages 9–11.

Green River (head of Colorado) near Kendall, Wyo., 1910.
Green River at Green River, Wyo., 1895–1906.
Green River at Jensen, Utah, 1903–1906.
Green River at Ouray, 1904–5.
Green River at Green River, Utah, 1894–1899 and 1905–1910.
Green River at Little Valley, Utah, 1910.
Colorado River at Hardyville, Ariz., 1905–1907.
Colorado River at Mohave City, Ariz., 1902–3.
Colorado River at Yuma, Ariz., 1895–1909.
    New Fork River near (10 miles above) Cora, Wyo., 1910.
    New Fork River near (3 miles below) Cora, Wyo., 1905.

Colorado River—Continued.
Pine Creek near Pinedale, Wyo., 1904–1906 and 1910 (diversions between old and new stations).
Pole Creek at Fayette, Wyo., 1904–1906.
Pole Creek near Pinedale, Wyo., 1910.
Fall Creek at Fayette, Wyo., 1904–5.
Boulder Creek at Boulder (New Fork), Wyo., 1904–1906.
East Fork River at New Fork, Wyo., 1905–6.
Green River, Black Fork, at Granger, Wyo., 1896–1900.
Big Sandy Creek near Big Sandy, Colo., 1910.
Beaver Creek near Ladore, Colo., 1910.
Vermilion Creek at Ladore, Colo., 1910.
Yampa River at Yampa, Colo., 1910.
Yampa River at Steamboat Springs, Colo., 1904–1906 and 1910.
Yampa River at Craig, Colo., 1901–2, 1904–1906, and 1910.
Yampa River near Maybell, Colo., 1904–5 and 1910.
Trout Creek at Pinnacle, Colo., 1910 (tributary to Terrible Creek).
Soda Creek at Steamboat Springs, Colo., 1910.
Elk River near Clark, Colo., 1910.
Elk River near Trull, Colo., 1904–1906, and 1910.
Fish Creek at Dunkley, Colo., 1910 (tributary to Sage Creek).
Elk Head Creek near Craig, Colo., 1906 and 1910.
Fortification Creek at Craig, Colo., 1905–6, and 1910.
Williams River near Pyramid, Colo., 1910.
Williams River at Hamilton, Colo., 1904–1906, and 1910.
Milk Creek at Axial, Colo., 1904–5.
Little Snake River at Dixon, Wyo., 1910.
Little Snake River at Maybell, Colo., 1904.
Slater Creek near Slater, Colo., 1910.
Ashley Creek at Vernal, Utah, 1900–1904.
Ashley Creek, Dry Fork, at Vernal, Utah, 1904.
Duchesne River, North Fork, above Forks, Utah, 1904.
Duchesne River at Myton, Utah, 1899–1910.
Duchesne River, West Fork, above Forks, Utah, 1904.
Rock Creek (East Creek), 10 miles above mouth, Utah, 1904.
Strawberry River above mouth of Indian Creek, near Strawberry Valley, Utah, 1909–10.
Strawberry River below mouth of Indian Creek, near Strawberry Valley, Utah, 1903–1906 and 1908–9.
Strawberry River at Theodore, Utah, 1908–1910.
Indian Creek in Strawberry Valley, Utah, 1905–6 and 1909–10.
Trail Hollow Creek in Strawberry Valley, Utah, 1909–10.
Currant Creek 13 miles above mouth, Utah, 1904.
Currant Creek 3 miles above mouth, Utah, 1904.
Red Creek above Narrows, Utah, 1904.
Lake Fork, West Fork, 10 miles above Forks, Utah, 1904.
Lake Fork below Forks, Utah, 1904, 1907–1910.
Lake Fork near Myton, Utah, 1900–1904, 1907–1910.
Lake Fork, East Fork, 8 miles above Forks, Utah, 1904.
Uinta River near Whiterocks, Utah, 1899–1904, 1907–1910.
Uinta River at Fort Duchesne, Utah, 1899–1904, 1906–1910.
Uinta River at Ouray School, Utah, 1899–1904.
Whiterocks River near Whiterocks, Utah, 1899–1904, 1907–1910.

Colorado River—Continued.
White River, North Fork, at Buford, Colo., 1903–1906, and 1910.[1]
White River at Meeker, Colo., 1901–1906, and 1910.
White River at White River City, Colo., 1895.
White River at Rangely, Colo., 1904–5.
White River at Dragon, Utah, 1906.
White River at Ouray, Utah, 1904.
Marvine Creek near Buford, Colo., 1903–1906.
White River, South Fork, near Buford, Colo., 1903–1906, and 1910.
Price River near Helper, Utah, 1904–1910.
Price River at Woodside, Utah, 1910.
San Rafael River near Green River, Utah, 1909–10.
Cottonwood Creek near Orangeville, Utah, 1909–10.
Ferron Creek near Ferron, Utah, 1909–10.
Huntington Creek near Huntington, Utah, 1909–10.
Grand River, North Fork, near Grand Lake, Colo., 1904–1910.
Grand River near Granby, Colo., 1908–1910.
Grand River at Sulphur Springs, Colo., 1904–1910.
Grand River near Kremmling, Colo., 1904–1910.
Grand River near Wolcott, Colo., 1906–1908.
Grand River at Shoshone, Colo., 1897.
Grand River at Glenwood Springs, Colo., 1899–1910.
Grand River near Palisades, Colo., 1902–1910.
Grand River near Grand Junction, Colo., 1895–1900.
North Inlet to Grand Lake at Grand Lake, Colo., 1905–1910.
Grand Lake Outlet at Grand Lake, Colo., 1904–1910.
Grand River, South Fork, near Lehman, Colo., 1907–8.
Fraser River near Arrow, Colo., 1910.
Fraser River at upper station near Fraser, Colo., 1908–1910.
Fraser River at lower station near Fraser, Colo., 1907–1909.
Fraser River at Granby Coulter, Colo., 1904–1909.
Big Jim Creek near Fraser, Colo., 1907–1909.
Little Jim Creek near Fraser, Colo., 1907–1909.
Vasquez Creek at upper station near Fraser, Colo., 1908–9.
Vasquez Creek at lower station near Fraser Colo., 1907–1909.
Elk Creek near Fraser, Colo., 1907–1909.
St. Louis Creek at upper station near Fraser, Colo., 1908–9.
St. Louis Creek at lower station near Fraser, Colo., 1908–9.
North Ranch Creek at upper station near Rollins Pass, Colo., 1908–9.
North Ranch Creek at lower station near Rollins Pass, Colo., 1907–1909.
Middle Ranch Creek at upper station near Arrow, Colo., 1908–9.
Middle Ranch Creek at lower station near Arrow, Colo., 1907–1909.
South Ranch Creek at upper station near Arrow, Colo., 1908–9.
South Ranch Creek at lower station near Arrow, Colo., 1907–1909.
Williams Fork near Scholl, Colo., 1910.
Williams Fork near Sulphur Springs, Colo., 1904–1910.
Troublesome River at Troublesome, Colo., 1904–5.
Muddy River at Kremmling, Colo., 1904–5.
Blue River near Dillon, Colo., 1910.

[1] The station maintained in 1910 is 5 miles below the old station, but no large tributaries enter between.

Colorado River—Continued.
Grand River—Continued.
Blue River near Kremmling, Colo., 1904–1908.
Tenmile Creek near Kokomo, Colo., 1904.
Tenmile Creek near Uneva Lake, Colo., 1903.
Tenmile Creek near Dillon, Colo., 1910.
Snake River near Dillon, Colo., 1910.
Eagle River near Eagle, Colo., 1905–1907.
Eagle River at Gypsum, Colo., 1907–1909.
Roaring Fork near Emma, Colo., 1908–9.
Roaring Fork at Glenwood Springs, Colo., 1906–1910.
Frying Pan River at Basalt, Colo., 1908–9.
Crystal River near Marble, Colo., 1910.
Crystal River near Carbondale (Sewell), Colo., 1908–9.
West Divide Creek at Hostutler's ranch, near Raven, Colo., 1909.
West Divide Creek at Beard's ranch, near Raven, Colo., 1909–10.
West Divide Creek at Raven, Colo., 1909–10.
West Mamm Creek near Rifle, Colo., 1909–10.
Taylor River near Almont, Colo., 1905 and 1910.
Gunnison River near Gunnison, Colo., 1910.
Gunnison River near Iola, Colo., 1900–1903.
Gunnison River near Cimarron, Colo., 1903–1905.
Gunnison River at River Portal (east portal of Gunnison tunnel), Colo., 1905–1910.
Gunnison River near Cory, Colo., 1903–1905.
Gunnison River at Roubideau, Colo., 1897.
Gunnison River at Whitewater, Colo., 1897, 1901–1906.
Gunnison River near Grand Junction, Colo., 1895, 1897–1899.
East River at Almont, Colo., 1905 and 1910.
Cement Creek near Crested Butte, Colo., 1910.
Tomichi Creek near Gunnison, Colo., 1910.
Quartz Creek near Pitkin, Colo., 1910.
Cimarron Creek at Cimarron, Colo., 1903–1905.
Gunnison River, North Fork, near Hotchkiss, Colo., 1903–1906.
Uncompahgre River near Colona, Colo., 1903–1906.
Uncompahgre River near Ouray, Colo., 1908.
Uncompahgre River near Fort Crawford, Colo., 1910.
Uncompahgre River at Fort Crawford, Colo., 1895–1899, 1908–1910.
Uncompahgre River at Montrose, Colo., 1900, 1903–1910.
Uncompahgre River near Delta, Colo., 1903–1910.
Dolores River near Dolores, Colo., 1895–1903 and 1910.
San Miguel River near Fall Creek, Colo., 1895–1899 and 1910.
San Miguel River near Placerville, Colo., 1910.
Fremont River near Thurber, Utah, 1909–10.
Muddy Creek near Emery, Utah, 1909–10.
Escalante Creek near Escalante, Utah, 1909–10.
San Juan River at Arboles, Colo., 1895–1899 and 1910.
San Juan River at Turley, N. Mex., 1907–8.
San Juan River at Blanco, N. Mex., 1908–1910.
San Juan River near Bloomfield, N. Mex., 1909–10.
San Juan River near Farmington, N. Mex., 1904–1906.
Piedra River at Arboles, Colo., 1895–1899 and 1910.
Los Pinos River near Ignacio, Colo., 1899–1903 and 1910.
Animas River at Silverton, Colo., 1903.
Animas River at Durango, Colo., 1895–1905 and 1910.

Colorado River—Continued.
San Juan River—Continued.
Animas River at Aztec, N. Mex., 1904, 1907–1910.
Animas River near Farmington, N. Mex., 1904–5.
Florida River near Durango, Colo., 1899, 1901–1903, and 1910.
La Plata River at Hesperus, Colo., 1904–1906 and 1910.
La Plata River at La Plata, N. Mex., 1905–1910.
Mancos River at Mancos, Colo., 1898–1900.
West Mancos River near Mancos, Colo., 1910.
Little Colorado River at St. Johns, Ariz., 1906–1909.
Little Colorado River at Woodruff, Ariz., 1905–1908.
Little Colorado River at Holbrook, Ariz., 1905–1909.
Silver Creek at Snowflake, Ariz., 1906–1908.
Silver Creek at Canyon Station, Ariz., 1906.
Woodruff ditch at Woodruff, Ariz., 1906.
Chevelon Fork near Winslow, Ariz., 1906–1908.
Clear Creek near Winslow, Ariz., 1906–1909.
Virgin River at Virgin, Utah, 1909–10.
Santa Clara River near Central, Utah, 1909–10
Santa Clara River near St. George, Utah, 1909–10.
Muddy River near Moapa, Nev., 1904–1906 and 1910.
Bill Williams River near Swansea, Ariz., 1910.
Gila River near Cliff, N. Mex., 1904–1907.
Gila River near Redrock, N. Mex., 1908–1910.
Gila River at Guthrie, Ariz., 1910.
Gila River at San Carlos, Ariz., 1899–1905 and 1910.
Gila River near Buttes, Ariz., 1889–1890 and 1895–1899.
Gila River at Dome (Gila City), Ariz., 1903–1906.
San Francisco River at Alma, N. Mex., 1904–1907 and 1909–10.
San Francisco River at Clifton, Ariz., 1910.
Whitewater Creek near Mogollon, N. Mex., 1910.
San Carlos River near San Carlos, Ariz., 1910.
San Pedro River near Lewis Springs, Ariz., 1904–1906 and 1910.
San Pedro River near Dudleyville, Ariz., 1890.
Santa Cruz River near Nogales, Ariz., 1907 and 1909–10.
Santa Cruz River and ditches at Tucson, Ariz., 1905–1910.
Queens Creek at Whitlows, Ariz., 1896.
Salt River at Roosevelt, Ariz., 1901–1907 and 1910.
Salt River below mouth of Cherry Creek, near Roosevelt, Ariz., 1906.
Salt River 50 miles above Phoenix, Ariz., 1890.
Salt River at Arizona dam, Ariz., 1888–1891.
Salt River at McDowell, Ariz., 1888–1910.
Tonto Creek at Roosevelt, Ariz., 1901–1904.
Verde River at McDowell, Ariz., 1888–1910.
Agua Fria River near Glendale, Ariz., 1910.
Hassayampa River near Wickenburg, Ariz., 1910.
Salton Sea near Salton, Cal., 1904–1910.
Alamo River near Brawley, Cal., 1908–1910.
New River near Brawley, Cal., 1908–1910.
Canal stations in Colorado River basin:
Imperial canal (main) near Calexico, Cal., 1904–5.
Boundary canal near Calexico, Cal., 1905.

*

Colorado River—Continued.
Canal stations in Colorado River basin—Continued.
Wisteria canal near Calexico, Cal., 1905.
Imperial canal 10 miles below Yuma, Ariz., Mexican boundary line, 1903–1905.
Holt canal at Calexico, Cal., 1904–5.
Hemlock canal at Calexico, Cal., 1904–5.
Alamo channel near Calexico, Cal., 1904.
Alamitos canal near Calexico, Cal., 1904–5.

GENERAL FEATURES OF COLORADO RIVER BASIN.

Colorado River is formed in the southeastern part of Utah by the junction of Grand and Green rivers. The Green is larger than the Grand and is the upward continuation of the Colorado. Including the Green, the Colorado is about 2,000 miles long. The region drained is about 800 miles long, ranges in width from 300 to 500 miles, and contains about 300,000 square miles. It comprises the southwestern part of Wyoming, the western part of Colorado, the eastern half of Utah, practically all of Arizona, and small portions of California, Nevada, New Mexico, and old Mexico. Most of this area is arid, the mean annual rainfall being about $8\frac{1}{2}$ inches. The streams receive their supply from the melting snows on the high mountains of Wyoming, Utah, and Colorado.

The basin comprises two distinct portions. The lower third is but little above the level of the sea, though here and there ranges of mountains rise to elevations of 2,000 to 6,000 feet. This part of the valley is bounded on the north by a line of cliffs which present a bold and in many places vertical step of hundreds or thousands of feet to the tableland above. The upper two-thirds of the basin stands from 4,000 to 8,000 feet above sea level and is bordered on the east, west, and north by ranges of snow-clad mountains, which attain altitudes ranging from 8,000 to 14,000 feet above sea level. Through this plateau the Colorado and its tributaries have cut narrow gorges or canyons in which they flow at almost inaccessible depths. At points where lateral streams enter, the canyons are broken by narrow transverse valleys, diversified by bordering willows, clumps of box elder, and small groves of cottonwood. The whole upper basin of the Colorado is traversed by a labyrinth of these canyons, most of which are dry during the greater portion of the year and carry water only during the melting of the snow and the brief periods of the autumnal and spring rains.

GREEN RIVER AND THE MAIN COLORADO RIVER.

GENERAL FEATURES OF AREA DRAINED.

Green River and its tributaries[1] drain an area rudely triangular in outline, bounded on the north and east by the Wind River Mountains and the ranges forming the Continental Divide, on the south and east by the White River Plateau and the Roan or Book Cliffs, and on the north and west by the Gros Ventre and Wyoming mountains and the great Wasatch Range. The greatest length of the basin, north and south, is about 370 miles. In an east-west direction it measures at the widest part about 240 miles. The total drainage area is approximately 41,000 square miles. Altitudes range from 14,000 feet in the high mountains to about 3,800 feet at the mouth of the Grand.

The area includes a large part of western Wyoming, northwestern Colorado, and eastern Utah. The Uinta and Uncompahgre Indian reservations are located in this basin in northeastern Utah.

Green River heads on the western slope of the Wind River Mountains in western Wyoming, its ultimate source being a number of small lakes fed by the glaciers and immense snow deposits always to be found on Fremont and neighboring peaks. For perhaps 25 miles the river flows northwestward through the mountains; it then turns abruptly and runs in a general southerly direction across western Wyoming and Utah. A few miles below the Wyoming-Utah boundary another sharp turn carries the river eastward near the east end of the range. It then flows southward in Colorado for about 25 miles, turns back into Utah, and continues to flow in a southwesterly and southerly direction until it unites with the Grand to form the Colorado. Its length, measured roughly along the course, is approximately 425 miles.

In its upper course the Green receives as tributaries numerous streams heading in the Wind River, Gros Ventre, and Wyoming ranges, some of them extending so far back into the abrupt, ragged canyons that they dovetail with streams flowing in the opposite direction. The most important of these tributaries are New Fork River, Big Sandy Creek, Labarge Creek, Fontenelle Creek, Black Fork, and Henry Fork. South of the Uinta Mountains the first large stream flowing into the Green is the Yampa, which comes in from the east at the point where the Green turns westward to reenter Utah after its southward journey in Colorado. Farther south Ashley Creek and Duchesne and White rivers discharge their waters into the Green, Ashley Creek and the Duchesne from the west and the White from the east. Below this point the only tributaries of

[1] The geology of this basin is described in the Eleventh Ann. Rept. U. S. Geol. and Geog. Survey Terr., for 1877, pp. 509–646. Information in regard to the hydrography is contained in the first to fourth annual reports of the Reclamation Service and in the United States Geological Survey reports.

importance are Price, Minnie Maud, and San Rafael rivers, which enter from the west, the San Rafael at a point about 32 miles above the junction of the Green and the Grand.

Over the plains portion of the basin, which includes considerably over half of it, the average annual precipitation is probably less than 10 inches annually; over much of the remainder the rainfall averages between 10 and 15 inches, and in only a very small area in the high mountains does the annual precipitation exceed 20 inches.

Throughout this basin the winters are severe and most of the streams have a heavy ice cover for several months. There is usually an abundance of snow in the high mountains, but the winters on the plains are frequently open.

The waters of the Green and its tributaries are practically unused except for irrigation. From Wells, Wyo., to the Wyoming State line, a distance of 225 miles, the stream has an average fall of 11 feet to the mile; and from the Wyoming State line to the mouth of Minnie Maud Creek, a distance of 200 miles, the average fall is 7 feet to the mile. Along these two sections of the river and on the headwaters there are many unutilized power sites.

From the junction of Green and Grand rivers the Colorado flows southwestward, passes across the northwestern corner of Arizona, then turns to the south, and for the remainder of its course forms a part of the southeastern boundary of Nevada and California and the western boundary of Arizona. It empties into the Gulf of California about 60 miles below Yuma, Ariz. The canyons through which it flows are world famed and need not here be described.

The Colorado has been called the Nile of America, and, like the Nile, it is subject to an annual summer rise which comes at the time the water is most needed for irrigation. It is of interest to compare the Colorado with the Nile and the Susquehanna. The Nile is similar in type; the Susquehanna shows the difference in flow between arid and humid regions. In the comparison a normal year, based on a 10-year record for Colorado and Susquehanna rivers and such data as could be found in regard to the Nile, have been used. The Colorado has been taken as the standard of comparison.

The Nile has 5.7 times the drainage area and the Susquehanna about one-eighth the area of the Colorado.

The rainfall in the Nile basin is 3.8 times greater; that in the Susquehanna basin is 4.5 times greater. The run-off per square mile from the Nile basin is 1.9 times greater; that from the Susquehanna basin is 37 times greater. The ratio of run-off to rainfall in the Nile basin is 2 times smaller; that of the Susquehanna basin is 8.2 times greater.

The discharge of the Nile is 10.8 times greater; that of the Susquehanna is 4.5 times greater.

The maximum flow of the Colorado is from 50,000 to 150,000 second-feet and occurs in May, June, or July; for the Nile it is about 353,000 second-feet and occurs about the first of September; for the Susquehanna it is from 150,000 to 550,000 second-feet and occurs during March, April, and May.

The minimum flow of the Colorado is from 2,500 to 3,000 second-feet and occurs during January and February; that of the Nile is about 14,500 second-feet and occurs about the end of May; for the Susquehanna it is from 2,200 to 11,000 second-feet and occurs in September and October.

The mean flow of the Colorado for the period 1894–1903 is 10,700 second-feet, as previously published. The mean flow for the period 1904–1910, however, is 25,400 second-feet; for the Nile it is about 115,800 second-feet; for the Susquehanna it is about 41,000 second-feet.

GREEN RIVER NEAR KENDALL, WYO.

This station, which is located just above the mouth of Gypsum Creek and at the Kendall forest ranger station, was established August 3, 1910.

Gage heights are obtained from chain gage.

Discharge measurements are made from a cable and car.

The stream bed is composed of small rounded bowlders and is probably permanent.

During the winter the relation between gage heights and discharge is probably affected by slush ice which collects on a riffle below the station.

This station is maintained in cooperation with the Forest Service, by which the gage heights are furnished.

Discharge measurements of Green River near Kendall, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 24	G. C. Baldwin	120	129	3.02	244
Oct. 15	George Belknap	112	114	.....	176

Daily gage height, in feet, of Green River near Kendall, Wyo., for 1910.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1	.....	.....	.....	11	3.4	.....	2.8	21	3.5	.....	.....
2	3.75	.....	2.8	12	3.5	.....	2.75	22	.....	3.05	2.7
3	.....	3.1	2.8	13	3.5	.....	2.8	23	3.4	.....	2.8
4	.....	.....	2.8	14	3.5	.....	2.75	24	.....	3.0	.....
5	.....	.....	.....	15	.....	.....	.....	25	.....	.....	2.8
6	.....	3.0	2.8	16	.....	.....	.....	26	.....	.....	2.8
7	.....	2.9	2.8	17	.....	.....	.....	27	.....	.....	.....
8	.....	.....	2.8	18	3.3	.....	.....	28	.....	.....	.....
9	3.5	2.85	2.8	19	.....	.....	2.75	29	.....	2.8	.....
10	3.4	.....	2.8	20	3.5	.....	2.8	30	.....	.....	.....
								31	.....	.....	.....

GREEN RIVER AT GREEN RIVER, UTAH.

This station, which is located at the highway bridge 200 feet upstream from the Rio Grande Western Railway bridge at Green River railroad station, near Elgin post office (originally called Blake), was established October 21, 1894, discontinued October 15, 1899, and reestablished in February, 1905. The gage was moved December 2, 1910, from the railroad bridge to the highway bridge, 200 feet upstream. Its datum is the same as that of the old gage at 5.53 feet.

A new bridge was erected at this point between the periods of maintenance of the original station and the present one. The datum of the gage maintained up to December 2, 1910, as near as can be learned, is 1.68 feet below the original datum and has remained the same since its establishment; but owing to the change in conditions of flow caused by the relocation of the bridge piers, it is impossible to utilize the early measurements in studies of new discharge curves.

Price River enters from the west about 16 miles above the station. Several irrigation projects are completed and being promoted in this drainage basin. The last ditch above the station on the right bank is about 6 miles upstream and on the left bank about 3 miles upstream.

Discharge measurements, which were formerly made from the railroad bridge and from a ferryboat, are now made from the highway bridge, where conditions favor accurate measurements. This bridge divides the measuring section into three parts, each 168 feet wide. The channel is somewhat shifting.

A careful determination, in 1909, of the angle which the bridge makes with the main current, necessitated a correction of 15 per cent in all discharge measurements made at the bridge from 1905 to 1910. The daily and monthly estimates of discharge for 1905 to 1909 have been revised and supersede those previously published.[1]

Ice usually exists at the station during December, January, and February. Monthly estimates during these periods have been obtained by considering the general behavior of the river at this station and by the aid of climatologic data.

Discharge measurements of Green River at Green River, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 26	Fuller and Epperson	465	4,260	9.0	[a] 18,400
Oct. 3	Canfield and Dort	408	1,450	5.67	[b] 2,240
Dec. 3	G. H. Canfield	421	1,460	5.52	[c] 2,280

[a] Measurement made from railroad bridge. Coefficient of 0.876 applied for correction on account of angle of bridge with the current.
[b] Measurement made from boat under ferry cable.
[c] Measurement made from highway bridge 200 feet upstream from railroad bridge.

[1] See Water-Supply Paper U. S. Geol. Survey No. 269, 1911.

Daily gage height, in feet, of Green River at Green River, Utah, for 1910.

[L. H. Green, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.6	7.0	5.5	7.65	9.95	9.4	7.0	6.25	4.8	5.0	5.9	5.5
2	6.8	7.0	5.85	7.35	10.35	9.75	6.9	6.45	4.8	5.3	5.85	5.5
3	6.9	7.0	6.05	7.3	10.25	9.8	6.65	6.25	7.0	5.5	5.8	5.5
4	7.0	7.0	6.2	7.2	10.15	9.7	6.6	6.15	5.8	5.5	5.75	5.5
5	7.0	7.0	7.35	6.95	9.95	9.6	6.5	6.0	5.05	5.6	5.65	5.5
6	7.0	7.1	7.6	7.0	9.5	9.6	6.5	6.0	5.0	5.7	5.6	5.4
7	7.0	7.1	9.7	7.0	9.4	9.7	6.5	5.75	5.0	5.7	5.6	5.4
8	7.0	7.1	10.8	7.0	9.15	9.7	6.4	6.05	5.0	5.7	5.6	5.4
9	7.0	7.1	9.1	7.0	9.2	9.45	6.3	6.1	5.0	5.7	5.5	5.4
10	7.0	7.1	9.6	7.0	9.2	9.25	6.3	5.9	5.0	5.7	5.5	5.4
11	7.0	7.1	8.95	7.0	9.25	9.0	6.1	5.65	5.0	5.6	5.5	5.4
12	7.0	7.1	8.6	6.9	9.45	8.9	6.0	5.55	5.05	5.6	5.5	5.4
13	7.0	6.9	8.25	7.15	9.6	8.7	5.9	5.4	5.1	5.7	5.5	5.4
14	7.0	6.75	7.9	7.35	10.1	8.45	5.8	5.3	5.1	5.7	5.75	5.4
15	7.0	6.45	7.65	7.7	10.5	8.35	5.7	5.3	5.3	5.7	6.05	5.4
16	7.0	6.25	7.55	7.95	10.55	8.15	5.7	5.3	5.3	5.8	6.0	5.4
17	7.0	6.2	7.45	8.1	10.5	7.85	5.7	5.2	5.6	6.85	5.75	5.4
18	7.0	6.2	7.3	8.35	10.35	8.0	5.7	5.2	6.05	6.7	5.55	5.4
19	7.0	6.2	7.2	8.05	10.25	8.0	5.5	5.2	5.8	6.6	5.5	5.35
20	7.0	6.05	7.3	8.1	10.0	7.9	5.7	5.2	5.85	6.5	5.5	5.25
21	7.0	5.95	7.3	8.0	9.4	7.9	5.7	5.1	5.85	6.55	5.5	5.0
22	7.0	5.75	7.3	8.0	9.2	7.8	5.6	5.0	5.75	6.6	5.5	4.85
23	7.0	5.7	7.45	8.3	9.1	7.7	5.5	5.1	5.65	6.4	5.5	4.4
24	7.0	5.5	7.7	8.4	9.1	7.6	5.4	5.0	5.6	6.35	5.5	4.4
25	7.0	5.5	7.8	8.65	9.0	7.45	5.4	5.0	5.6	6.3	5.5	4.35
26	7.0	5.5	7.8	9.0	9.0	7.3	5.3	5.0	5.6	6.25	5.5	4.3
27	7.0	5.65	7.9	9.35	8.9	7.1	5.3	5.0	5.6	6.15	5.5	4.3
28	7.0	5.85	7.9	9.2	8.8	7.0	5.3	4.9	5.5	6.05	5.5	4.5
29	7.0	.....	8.0	9.45	8.55	6.95	5.5	4.9	5.4	6.0	5.5	4.6
30	7.0	.....	8.0	9.95	8.4	7.0	5.6	4.9	5.05	6.0	5.5	4.7
31	7.0	.....	7.9	.....	9.4	.....	6.05	4.8	.....	6.0	.....	4.7

NOTE.—Gage heights affected by ice from Jan. 1 to Feb. 20, Mar. 7 to 9, and Dec. 26 to 31.

Daily discharge, in second-feet, of Green River at Green River, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,200	2,700	11,000	24,800	18,900	6,500	4,050	1,100	1,300	3,000	2,000
2	.....	1,200	3,660	9,580	27,500	21,000	6,120	4,650	1,100	1,640	2,860	2,000
3	.....	1,200	4,320	9,350	26,800	21,300	5,260	4,050	6,500	2,000	2,720	2,000
4	.....	1,200	4,820	8,890	26,100	20,700	5,100	3,750	2,720	2,000	2,590	2,000
5	.....	1,200	9,580	7,780	24,800	20,100	4,800	3,300	1,350	2,220	2,340	2,000
6	.....	1,200	10,800	8,000	21,800	20,100	4,800	3,300	1,300	2,460	2,220	1,800
7	.....	1,200	13,700	8,000	21,200	20,700	4,800	2,590	1,300	2,460	2,220	1,800
8	.....	1,200	16,600	8,000	19,500	20,700	4,500	3,450	1,300	2,460	2,220	1,800
9	.....	1,200	19,500	8,000	19,900	19,200	4,200	3,600	1,300	2,460	2,000	1,800
10	.....	1,200	22,400	8,000	19,900	18,000	4,200	3,000	1,300	2,460	2,000	1,800
11	.....	1,200	18,300	8,000	20,200	16,500	3,600	2,340	1,300	2,220	2,000	1,800
12	.....	1,300	16,200	7,560	21,500	15,900	3,300	2,110	1,350	2,220	2,000	1,800
13	.....	1,500	14,200	8,660	22,400	14,700	3,000	1,800	1,400	2,460	2,000	1,800
14	.....	2,000	12,300	9,580	25,800	13,200	2,720	1,640	1,400	2,460	2,590	1,800
15	.....	7,500	11,000	11,300	28,500	12,800	2,460	1,640	1,640	2,460	3,450	1,800
16	.....	3,000	10,500	12,500	28,800	11,800	2,460	1,640	1,640	2,720	3,300	1,800
17	.....	3,500	10,100	13,300	26,100	10,200	2,460	1,500	2,220	5,940	2,590	1,800
18	.....	4,000	9,350	14,700	25,000	11,000	2,460	1,500	3,450	5,420	2,110	1,800
19	.....	4,300	8,890	13,100	24,300	11,900	2,000	1,500	2,720	5,100	2,000	1,720
20	.....	4,320	9,350	13,300	22,600	10,500	2,460	1,500	2,860	4,800	2,000	1,570
21	.....	3,980	9,350	12,800	18,900	10,500	2,460	1,400	2,860	4,950	2,000	1,300
22	.....	3,360	9,350	12,800	17,700	10,000	2,220	1,300	2,590	5,100	2,000	1,150
23	.....	3,220	10,100	14,400	17,100	9,540	2,000	1,400	2,340	4,500	2,000	810
24	.....	2,700	11,300	15,000	17,100	9,080	1,800	1,300	2,220	4,350	2,000	810
25	.....	2,700	11,800	16,500	16,500	8,400	1,800	1,300	2,220	4,200	2,000	770
26	.....	2,700	11,800	18,600	16,500	7,740	1,640	1,300	2,220	4,050	2,000	930
27	.....	3,080	12,300	20,800	15,900	6,900	1,640	1,300	2,220	3,750	2,000	930
28	.....	3,660	12,300	19,900	15,300	6,500	1,640	1,200	2,000	3,450	2,000	990
29	.....	.....	12,800	21,500	13,800	6,310	2,000	1,200	1,800	3,300	2,000	990
30	.....	.....	12,800	24,800	13,000	6,500	2,220	1,200	1,350	3,300	2,000	990
31	.....	.....	12,300	.....	18,900	.....	3,450	1,100	.....	3,300	.....	900

NOTE.—Daily discharge, Feb. 1-20, Mar. 7-9, and Dec. 26-31, estimated on account of presence of ice. Mean discharge for January estimated at 1,000 second-feet.

Daily discharges except for period during which ice was present determined from two curves applicable as follows: Jan. 1 to May 16, fairly well defined between 1,800 and 24,000 second-feet; May 17 to Dec. 31, fairly well defined between 1,200 and 9,000 second-feet.

Monthly discharge of Green River at Green River, Utah, for 1910.

[Drainage area, 38,200 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	[a] 1,000	0.026	0.03	61,500	D.
February	7,500	[a] 1,200	2,500	.065	.07	139,000	D.
March	22,400	2,700	11,400	.298	.34	701,000	C.
April	24,800	7,560	12,500	.327	.36	744,000	A.
May	28,800	13,000	21,200	.555	.64	1,300,000	B.
June	21,300	6,310	13,700	.359	.40	815,000	C.
July	6,500	1,640	3,230	.085	.10	199,000	B.
August	4,650	1,100	2,160	.056	.06	133,000	B.
September	6,500	1,100	2,040	.053	.06	121,000	B.
October	5,940	1,300	3,280	.086	.10	202,000	B.
November	3,450	2,000	2,270	.059	.07	135,000	B.
December	2,000	770	1,520	.040	.05	93,500	B.
The year	28,800	770	6,420	.168	2.28	4,640,000	

[a] Estimated.

GREEN RIVER AT LITTLE VALLEY, UTAH.

This station, which is located at Little Valley, Utah, 6 miles downstream from the old station at Green River railroad station, near Elgin post office, was established December 18, 1910. No tributaries enter between these two stations except a few washes which carry water during floods.

Measurements are made from a ferry cable (Pl. III, *A*).

The gage is on the left bank, 100 feet upstream from the ferry, and is in two sections, a vertical staff for low-water and a slope gage for high-water readings.

The stream bed consists of loose sand overlying gravel and is liable to change during high water.

The following discharge measurement was made by G. H. Canfield:

December 18, 1910: Width, 310 feet; area, 1,030 square feet; gage height, 0.90 feet; discharge, 2,180 second-feet.

The following additional gage heights were obtained:

December 19, 0.9 foot; December 20, 0.75 foot; December 21, 0.6.

COLORADO RIVER AT YUMA, ARIZ.

This station, which is located in the town of Yuma, Ariz., 1½ miles below the mouth of Gila River and 10 miles by river above the Mexican border, furnishes information concerning the amount of water available for irrigation along the lower Colorado River. Records of river height have been kept by the Southern Pacific Co. since April 1, 1878.

At Laguna dam, 14 miles above the station, approximately 60 second-feet is diverted for irrigation on the California side. At

A. GAGING STATION ON GREEN RIVER AT LITTLE VALLEY, UTAH.

B. UPSTREAM VIEW OF GILA RIVER FROM RAILROAD BRIDGE AT GUTHRIE, ARIZ.

About 500 feet below the gaging station.

Yuma below the station, an average of 100 second-feet is pumped from the river for irrigation in the Yuma Valley. At the Imperial canal headworks, 6 miles below Yuma, approximately 1,500 second-feet is diverted for use in Imperial Valley.

The records given herewith are furnished by the United States Reclamation Service, through F. L. Sellew, project engineer, Yuma, Ariz.

The gage is a vertical staff, in two sections, the upper section, reading above 24 feet, being the original gage established in 1876. It is located at the railroad bridge, 600 feet above the cable station. The elevation of the zero of the gage is 102.79 feet above sea level.

As the bed of the stream is composed of silt and sand and is very unstable, frequent measurements are necessary to properly determine the daily discharge. Neither bank is subject to overflow. Previous to May 31, 1903, discharge measurements were made from the railroad bridge. On that date a cable station was established at a point 600 feet below the bridge, and all measurements are now made from a car, except during highest floods, when a boat is used. At flood stages a large part of the water flows through an old channel and does not pass under the cable. At such times this overflow water is measured at the point where it passes under the railway trestle, one-third mile north of the main channel.

Discharge measurements of Colorado River at Yuma, Ariz., in 1910.

[By R. L. North and N. B. Conway.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 1	14.65	4,400	Mar. 29	19.3	33,800
4	20.7	48,700	31	20.1	38,800
6	19.7	38,400	Apr. 2	20.1	36,400
8	17.3	21,200	5	19.15	30,200
11	16.9	19,300	7	18.6	27,300
13	15.8	13,400	9	18.3	24,100
15	15.0	10,000	12	18.5	23,500
18	15.0	9,100	14	18.1	22,000
20	15.5	12,300	16	18.1	22,400
22	16.2	15,200	19	18.7	24,900
25	16.4	15,500	23	19.2	30,500
29	15.8	12,600	26	19.1	30,100
Feb. 1	15.4	10,600	28	19.9	33,800
3	15.6	10,200	30	20.3	38,500
5	15.8	10,300	May 3	21.5	49,200
8	15.8	9,500	5	22.0	54,900
10	15.8	9,300	7	22.7	65,300
14	15.9	8,800	10	22.9	70,900
17	15.9	8,700	10	22.9	63,600
19	15.7	8,100	12	22.1	61,600
21	15.8	8,400	12	22.1	55,900
24	15.8	8,400	14	21.5	50,400
26	16.0	8,200	17	21.6	53,100
Mar. 1	15.9	8,200	19	22.0	60,100
3	15.9	7,600	24	23.0	70,300
5	16.3	8,700	26	21.95	57,500
8	17.0	13,700	26	21.95	61,600
10	17.6	20,000	28	21.0	48,400
12	18.2	24,000	31	20.1	42,100
15	20.4	40,600	31	20.1	44,400
17	19.9	36,100	June 2	19.9	40,100
19	18.9	29,500	4	20.0	41,900
22	18.3	26,500	7	21.8	56,200
24	18.2	25,000	11	23.2	67,100
26	18.4	26,000	14	23.2	69,100

Discharge measurements of Colorado River at Yuma, Ariz., in 1910—Continued.

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 16	22.15	57,000
18	21.25	48,100
21	20.35	40,500
23	19.95	35,200
25	19.4	32,200
28	18.75	28,700
30	18.35	26,900
July 2	18.05	23,500
5	17.8	21,100
7	18.3	23,900
9	17.4	19,300
12	16.95	16,800
14	16.5	14,300
16	16.6	15,100
19	16.1	12,100
21	16.1	10,600
23	16.0	9,800
26	16.0	10,000
28	15.7	7,600
30	15.7	7,700
Aug. 1	15.9	8,300
4	16.3	10,100
6	16.6	11,600
9	16.1	11,100
11	16.2	12,700
13	16.4	13,200
16	15.8	10,300
18	16.0	10,500
20	15.8	9,400
23	15.4	7,800
25	15.5	7,800
27	15.5	7,800
31	15.15	6,500
Sept. 3	15.0	5,500
6	14.9	4,800
8	14.9	4,800
10	15.3	5,300
13	14.7	4,800
15	15.8	8,000
Sept. 17	15.6	7,100
20	15.2	6,100
22	15.5	6,900
24	15.5	6,200
27	15.2	5,600
29	15.8	7,600
Oct. 1	15.6	6,500
4	15.8	8,200
8	15.3	5,900
10	15.5	5,700
15	15.5	5,600
18	15.4	5,400
22	16.0	6,100
24	16.7	10,400
27	16.4	11,900
29	16.4	10,600
Nov. 1	16.2	8,710
3	16.25	8,470
5	16.4	8,970
8	16.2	8,040
10	16.2	7,160
12	16.2	7,450
15	16.5	8,410
19	16.3	7,840
22	16.4	8,210
26	16.8	8,890
30	16.3	7,790
Dec. 3	16.3	7,260
6	16.0	6,520
8	16.3	7,310
10	16.4	6,610
13	16.2	6,980
15	16.2	7,170
17	16.2	6,920
20	16.0	6,440
24	16.2	7,150
28	16.3	6,860
31	16.0	5,560

Daily gage height, in feet, of Colorado River at Yuma, Ariz., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.7	15.45	15.85	20.2	20.6	19.95	18.2	16.0	15.25	15.6	16.2	16.4
2	14.85	15.5	15.85	20.05	21.05	19.9	18.0	16.2	15.0	15.5	16.2	16.4
3	20.45	15.65	15.95	19.7	21.5	19.9	17.85	16.05	15.0	15.5	16.3	16.3
4	20.95	15.75	16.05	19.45	21.8	20.05	17.8	16.35	15.0	15.55	16.2	16.2
5	22.95	15.8	16.3	19.1	22.1	20.7	17.8	16.4	14.95	15.6	16.35	16.2
6	19.65	15.8	16.8	18.85	22.55	21.3	18.3	16.55	14.9	15.5	16.2	16.2
7	17.9	15.8	17.05	18.6	22.8	21.8	18.2	16.25	14.9	15.45	16.2	16.3
8	17.4	15.8	17.05	18.45	22.8	22.3	17.6	16.4	14.85	15.4	16.2	16.3
9	17.2	15.8	17.4	18.3	22.95	22.75	17.3	16.1	15.3	15.55	16.2	16.4
10	17.35	15.8	17.5	18.45	22.9	23.0	17.1	16.05	15.2	15.45	16.2	16.35
11	16.75	15.8	18.1	18.6	22.6	23.2	17.05	16.2	15.0	15.35	16.2	16.4
12	16.1	15.75	18.05	18.45	22.1	23.45	16.95	16.1	15.0	15.25	16.2	16.2
13	15.65	15.8	18.7	18.3	21.85	23.2	16.7	16.4	15.0	15.2	16.2	16.2
14	15.2	15.9	19.85	18.15	21.45	23.1	16.45	16.1	16.1	15.3	16.2	16.2
15	14.95	15.85	20.35	18.15	21.2	22.6	16.75	15.85	15.75	15.5	16.5	16.2
16	14.7	15.9	20.25	18.2	21.25	22.1	16.55	15.8	15.65	15.5	16.65	16.2
17	14.9	15.9	19.8	18.35	21.6	21.6	16.25	15.85	15.45	15.3	16.45	16.2
18	15.0	15.8	19.3	18.5	21.9	21.2	16.2	15.95	15.35	15.4	16.4	16.2
19	15.7	15.7	18.85	18.7	22.05	20.95	16.1	15.95	15.3	15.4	16.3	16.1
20	15.75	15.8	18.6	18.9	22.55	20.55	16.1	15.75	15.4	15.4	16.3	16.0
21	15.51	18.4	16.85	15.35	22.8	20.3	16.1	15.55	15.55	15.8	16.3	16.0
22	16.15	15.9	18.3	19.25	23.1	20.1	16.0	15.4	15.5	15.95	16.05	16.0
23	16.4	15.8	18.25	19.15	23.0	19.9	16.0	15.4	15.25	15.8	16.3	16.1
24	16.95	15.85	18.2	19.1	23.0	19.7	15.9	15.5	15.5	16.65	16.35	16.2
25	16.35	15.95	18.25	19.25	22.55	19.35	15.95	15.5	15.4	16.55	16.6	16.2
26	16.1	16.05	18.45	19.15	21.95	19.05	16.0	15.55	15.45	16.8	16.8	16.25
27	15.95	16.15	18.5	19.5	21.4	19.0	15.85	15.5	15.5	16.35	16.6	16.3
28	15.9	16.0	18.85	19.95	21.0	18.75	15.7	15.55	15.6	16.25	16.3	16.3
29	15.8	.....	19.3	20.15	20.7	18.7	15.7	15.15	15.8	16.35	16.3	16.0
30	15.55	.....	19.75	20.35	20.45	18.3	15.65	15.35	15.5	16.2	16.3	16.05
31	15.5	.....	20.1	.....	20.1	.....	15.6	15.2	.....	16.2	.....	16.0

Daily discharge, in second-feet, of Colorado River at Yuma, Ariz., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,600	10,800	8,000	38,500	40,900	40,500	25,200	8,900	6,800	6,500	8,700	8,200
2	6,200	10,400	7,700	36,100	45,000	40,100	23,100	10,000	5,600	6,300	8,300	8,000
3	49,500	10,500	7,900	34,000	49,200	40,500	21,800	8,800	5,500	6,400	8,500	7,300
4	53,800	10,500	7,900	32,000	52,700	42,500	21,200	10,500	5,300	6,900	7,900	7,100
5	67,500	10,300	8,700	30,200	56,100	47,800	21,100	10,600	5,100	7,200	8,800	7,300
6	35,300	10,000	12,300	28,500	61,700	52,400	24,500	11,200	4,800	6,800	7,900	7,500
7	24,800	9,800	14,200	27,300	66,000	56,200	23,100	10,300	4,800	6,600	7,900	7,800
8	21,200	9,500	14,100	25,700	65,200	59,900	19,500	12,200	4,600	6,300	8,000	7,310
9	21,200	9,400	17,800	24,100	65,300	63,300	18,400	11,100	5,800	6,500	7,600	7,250
10	22,300	9,300	19,200	24,600	64,200	65,400	17,100	11,100	5,000	5,400	7,200	6,300
11	17,800	9,200	24,000	25,100	60,700	67,100	17,100	12,700	4,600	5,000	7,300	7,100
12	14,100	8,500	23,700	23,200	55,900	69,400	16,800	11,500	4,900	4,500	7,500	6,600
13	12,300	8,500	26,600	22,800	53,500	68,400	15,400	13,200	5,100	4,300	7,200	7,000
14	10,300	8,800	37,000	22,500	49,900	68,400	13,900	11,600	11,300	4,700	7,000	7,100
15	9,600	8,500	40,200	22,600	48,000	62,500	16,600	10,300	7,800	5,600	8,400	7,200
16	7,900	8,800	39,300	23,200	49,300	56,700	14,800	10,300	7,300	5,600	9,500	7,100
17	8,800	8,700	35,300	23,700	53,100	51,800	12,600	10,000	6,300	4,900	8,500	6,900
18	9,100	8,400	32,300	24,100	57,300	47,700	12,500	10,200	6,200	5,400	8,200	7,200
19	14,000	8,100	29,200	24,900	60,700	45,600	12,100	10,300	6,200	5,000	7,800	7,000
20	14,500	8,500	27,900	26,800	64,500	42,000	11,300	9,100	6,600	4,900	7,700	6,500
21	18,300	8,700	26,800	29,000	67,200	40,500	10,600	8,300	7,500	5,800	7,500	6,400
22	14,800	9,000	26,500	30,200	69,700	37,400	10,300	7,700	6,900	5,900	6,300	6,300
23	16,500	8,400	25,800	30,200	69,700	34,800	9,800	7,800	5,400	5,500	7,200	6,700
24	21,000	8,800	25,000	30,000	70,300	33,900	9,200	8,100	6,200	10,200	7,200	7,100
25	15,000	8,600	25,200	30,900	64,300	31,800	9,600	7,800	5,800	10,600	8,100	6,900
26	13,500	8,600	26,300	30,300	57,000	30,200	10,000	8,100	6,200	13,500	8,900	7,000
27	12,900	9,200	27,100	32,000	52,000	30,000	8,800	7,800	6,600	11,500	8,200	7,100
28	12,900	8,600	30,300	34,200	48,400	28,700	7,600	8,200	7,100	10,200	6,900	6,900
29	12,600	.....	33,800	36,500	46,300	28,700	7,600	6,300	7,600	10,300	7,400	5,600
30	11,000	.....	36,700	38,900	44,500	26,500	7,500	7,400	6,100	9,200	7,800	5,800
31	10,900	.....	38,800	.....	42,100	.....	6,900	6,800	.....	9,000	.....	5,600

Monthly discharge of Colorado River at Yuma, Ariz., for 1910.

[Drainage area, 225,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	67,500	4,600	18,800	0.084	0.10	1,160,000
February	10,800	8,100	9,160	.041	.04	509,000
March	40,200	7,700	24,400	.108	.12	1,500,000
April	38,900	22,500	28,700	.128	.14	1,710,000
May	70,300	40,900	56,500	.251	.29	3,470,000
June	69,400	26,500	47,000	.209	.23	2,800,000
July	25,200	6,900	14,700	.065	.08	904,000
August	13,200	6,300	9,620	.043	.05	592,000
September	11,300	4,600	6,170	.028	.03	367,000
October	13,500	4,300	6,980	.031	.04	429,000
November	9,500	6,300	7,850	.035	.04	467,000
December	8,200	5,600	6,940	.031	.04	427,000
The year	70,300	4,300	19,700	.088	1.20	14,300,000

TRIBUTARY BASINS.

NEW FORK RIVER BASIN.

GENERAL FEATURES.

New Fork River and its tributaries drain a portion of the western slopes of the Wind River Range, extending from Fremont Peak southeastward to Mount Bonneville, Mount Geikie, and Twin Buttes. The main stream flows in a general southerly course to a point near Cora, Wyo., where it turns sharply to the southwest, joining Green River about 40 miles below.

Pine, Pole, and Boulder creeks and East Fork River are the chief tributaries of the Newfork. These are all small streams, heading far back among the high peaks of the range and fed by the numerous springs and small mountain lakes with which the region is dotted. Fremont, Boulder, Fayette, Half Moon, Burnt, and Meadow lakes are the largest and most important of these. Fremont Lake, through which Pine Creek flows, has an area of approximately 2,500 acres.

The upper portions of the valleys of all these streams are forested and the valleys and rolling bench lands are covered with sagebrush and a sparse growth of nutritious grasses. The soil of the foothill region is sandy and gravelly in character, gradually becoming a rich loam at the lower levels.

NEW FORK RIVER NEAR CORA, WYO.

This station, which is located at the ranch of Eugene Alexander, 3½ miles below the outlet of New Fork Lake, was established July 29, 1910. A station was maintained on this stream 12 miles below the present site during 1905, but, as several tributaries enter and several ditches take water between the two sites, the records are not comparable.

Practically no water is diverted between the present station and New Fork Lake, and the records therefore indicate the amount of water available for storage in the lake.

The gage is a vertical staff. Discharge measurements are made by wading.

The following measurement was made by G. C. Baldwin:

September 23, 1910: Width, 24 feet; area, 11 square feet; gage height, 1.21 feet; discharge, 6.6 second-feet.

Daily gage height, in feet, and discharge, in second-feet, of New Fork River near Cora, Wyo., for 1910.

[Eugene Alexander, observer.]

Day.	July.		Aug.		Sept.		Oct.		Nov.		Dec.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.7	42	1.25	9	1.2	7	1.2	7	1.2	7
2	.....	.....	1.7	42	1.25	9	1.2	7	1.2	7	1.2	7
3	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.2	7
4	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.2	7
5	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.3	11
6	.....	.....	1.65	37	1.25	9	1.2	7	1.2	7	1.7	42
7	.....	.....	1.6	32	1.25	9	1.2	7	1.2	7	1.3	11
8	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.3	11
9	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.2	7
10	.....	.....	1.55	28	1.2	7	1.2	7	1.2	7	1.2	7
11	.....	.....	1.55	28	1.15	5	1.2	7	1.2	7	1.2	7
12	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.2	7
13	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.4	17
14	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.2	7
15	.....	.....	1.5	23	1.15	5	1.2	7	1.2	7	1.3	11
16	.....	.....	1.45	20	1.15	5	1.2	7	1.2	7	1.4	10
17	.....	.....	1.45	20	1.1	3	1.2	7	1.2	7	1.4	10
18	.....	.....	1.45	20	1.1	3	1.2	7	1.2	7	1.5	10
19	.....	.....	1.45	20	1.05	2	1.2	7	1.2	7	1.3	10
20	.....	.....	1.45	20	1.05	2	1.2	7	1.2	7	1.3	10
21	.....	.....	1.45	20	1.15	5	1.2	7	1.2	7	1.3	10
22	.....	.....	1.4	17	1.2	7	1.2	7	1.2	7	1.3	10
23	.....	.....	1.35	14	1.25	9	1.2	7	1.2	7	1.4	10
24	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.3	10
25	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.3	10
26	.....	.....	1.35	14	1.2	7	1.2	7	1.2	7	1.4	10
27	.....	.....	1.35	14	1.2	7	1.2	7	1.7	42	1.4	10
28	.....	.....	1.3	11	1.2	7	1.2	7	1.5	23	1.4	10
29	1.75	48	1.3	11	1.2	7	1.2	7	1.3	11	1.5	10
30	1.75	48	1.3	11	1.2	7	1.2	7	1.2	7	1.8	10
31	1.75	48	1.25	9	.....	.....	1.2	7	.....	.....	1.8	10

NOTE.—Daily discharge determined from a well-defined curve. Discharge estimated Dec. 16–31, on account of presence of ice, which probably affected the gage readings.

Monthly discharge of New Fork River near Cora, Wyo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
August	42	9	23.1	1,420	A.
September	9	2	6.5	387	A.
October	7	7	7.0	430	A.
November	42	7	8.8	524	A.
December	42	.....	10.5	646	C.

PINE CREEK NEAR PINEDALE, WYO.

Pine Creek, designated Fremont Creek on the earlier maps, rises on the southern slope of Fremont Peak, near the top, and flows southwestward about 25 miles to its junction with New Fork River. Its drainage area comprises 130 square miles, about 60 square miles being covered with forest. From its source to a point about 2 miles

beyond Fremont Lake, through which it flows, it is a winding stream descending by a series of falls and rapids, almost impassable even at low water.

The gaging station, which is located at an old Indian fording place below the outlet of Fremont Lake, about 4½ miles by wagon road from Pinedale and 115 miles from Rock Springs station, on the Union Pacific Railroad, was established July 22, 1910. A station described under the same name was maintained during 1904–1906 at a point about 1½ miles below the present station. Two ditches divert water from the stream between the old and the new sites.

A staff gage was installed July 22, 1910, and was reset September 26, 1910, at a different location. On September 20, 1910, a permanent chain gage was installed on the left bank.

High-stage measurements are made from a cable 50 feet below the chain gage; low-stage measurements are made by wading.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. C. Baldwin:

September 20, 1910: Width, 71 feet; area, 45 square feet; gage height, 1.72 feet; discharge, 36 second-feet.

Daily gage height, in feet, of Pine Creek near Pinedale, Wyo., for 1910.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1	0.7	0.6	11			21		
2	.7		12		0.55	22	0.6	0.5
3			13			23		
4		.6	14			24		
5			15	0.6		25		
6			16		.5	26	.6	
7			17		.5	27		
8		.55	18	.6		28		
9	.6		19		.5	29		
10			20			30	.6	
						31		

NOTE.—Creek frozen over on Nov. 24.

POLE CREEK NEAR PINEDALE, WYO.

Pole Creek rises on the southwestern slope of New Fork Peak, flows southwestward, and unites with New Fork River about midway between the points at which that stream is joined by Pine Creek and East Fork River. It is fed by numerous small lakes, of which Fayette and Half Moon lakes are the largest.

The gaging station, which is located just below the mouth of Fall Creek and about 5 miles from Pinedale, Wyo., was established July 25, 1910.

One ditch diverts water from Pole Creek above the present station.

A chain gage is fastened to the right bank of the stream.

Measurements are made by wading at all stages.

From 1904 to 1906 a gaging station was maintained on Pole Creek about 1¼ miles above the present site and above the mouth of Fall Creek, the outlet of Burnt Lake. During 1904 and 1905 a station was maintained on Fall Creek three-fourths of a mile above its mouth. The records obtained at the present station indicate the amount of water flowing from Pole Creek and Burnt Lake and available for power development.

Discharge measurements of Pole Creek near Pinedale, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 25	J. C. Hoyt			2.61	101
Sept. 21	G. C. Baldwin	36	29.0	2.00	17

Daily gage height, in feet, of Pole Creek near Pinedale, Wyo., for 1910.

[J. C. Coble, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			2.15	2.0	2.0		16						
2		2.5					17		2.15				
3						2.0	18						
4							19						
5		2.4					20			2.0			
6							21			2.0	2.0		
7		2.35					22						
8							23						
9							24						
10				2.0			25	2.6					
11							26						
12							27	2.6		2.0			
13							28						
14							29						
15							30	2.45					
							31						

NOTE.—A chain gage installed Sept. 21, 1910, read same as old gage.

BIG SANDY RIVER NEAR BIG SANDY, WYO.

This station, which is located at Leckie's ranch, just above the dam site of the Eaton Irrigation Co. and below all mountain tributaries, was established July 26, 1910.

A chain gage is located on the left bank about one-quarter mile below the Leckie ranch house.

Low-stage measurements are made by wading; at high stages measurements are made from a cable about 200 yards below the gage.

Discharge measurements of Big Sandy River near Big Sandy, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 26	J. C. Hoyt	34	41	5.50	50
Sept. 28	Baldwin and Belknap	24	19	5.26	20

Daily gage height, in feet, of Big Sandy River near Big Sandy, Wyo., for 1910.

[Mrs. Anna Leckie, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Day.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	5.75	5.25	5.2	5.2	16	.....	5.3	.....	5.3	5.2
2	.....	5.6	.....	5.25	5.2	17	.....	5.3	5.25	5.3	5.2
3	.....	5.55	.....	.....	5.2	18	.....	5.3	.....	.....	5.15
4	.....	5.5	.....	5.3	5.2	19	.....	5.3	.....	5.3	5.2
5	.....	5.5	.....	5.3	5.2	20	.....	5.3	.....	5.25	5.2
6	.....	5.45	5.2	5.3	5.2	21	.....	5.3	.....	5.25	.....
7	.....	5.4	.....	5.3	5.2	22	.....	5.3	.....	5.25	.....
8	.....	5.4	5.2	5.25	5.2	23	.....	5.25	.....	5.3	.....
9	.....	5.35	5.2	5.25	5.2	24	.....	5.2	.....	5.3	.....
10	.....	5.35	.....	.....	5.2	25	.....	5.2	5.25	5.25	.....
11	.....	5.35	.....	.....	5.2	26	5.5	5.2	.....	5.25	.....
12	.....	5.35	.....	5.3	5.15	27	5.5	5.2	5.25	5.25	.....
13	.....	5.35	5.25	5.3	5.2	28	5.5	5.2	5.25	5.3	.....
14	.....	.....	.....	5.3	5.2	29	5.55	5.25	5.25	5.3	.....
15	.....	.....	.....	.....	5.2	30	5.55	5.25	5.25	5.3	.....
						31	5.7	5.25	.....	.....	.....

NOTE.—The observer's note of Nov. 21 states that creek was frozen over.

BEAVER CREEK NEAR LADORE, COLO.

This station, which is located at Meyer's ranch, about 16 miles from Ladore, Colo., was established June 17, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical rod gage is fastened to the right bank at the footbridge.

Discharge measurements are made from a foot log 100 feet below the ranch house.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Beaver Creek near Ladore, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17[a]	C. L. Chatfield	5	2.5	.....	2.1
Aug. 30[a]	.....do	.....	.....	.....	[b] 2.0
Oct. 29	.....do	3.5	1.5	0.60	1.2
29	.....do	.....	37	4.05	[c] 455

[a] No water in stream below ditches at station.
[b] Estimated.
[c] Discharge obtained by slope measurement and use of Kutter's formula.

Daily gage height, in feet, and discharge, in second-feet, of Beaver Creek near Ladore, Colo., for 1910.

Day.	April.		May.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1				400	0.2	0.3	0.55	1.0	0.55	1.0	0.75	3.0
2				350	.2	.3	.55	1.0	.6	1.2	.75	3.0
3				350	.2	.3	.55	1.0	.6	1.2	.75	3.0
4				300	.2	.3	.55	1.0	.6	1.2	.75	3.0
5				200	.3	.4	.55	1.0	.6	1.2	.75	3.0
6				200	.4	.5	.55	1.0	.6	1.2	.75	3.0
7				100	.5	.7	.55	1.0	.6	1.2	.75	3.0
8				50	.5	.7	.55	1.0	.6	1.2	.75	3.0
9				25	.5	.7	.55	1.0	.6	1.2	.75	3.0
10				10	.5	.7	.55	1.0	.7	2.3	.75	3.0
11				5	.5	.7	.55	1.0	.7	2.3	.75	3.0
12				5	.55	1.0	.55	1.0	.7	2.3	.75	3.0
13				5	.55	1.0	.55	1.0	.7	2.3	.75	3.0
14				3	.55	1.0	.55	1.0	.7	2.3	.75	3.0
15				3	.55	1.0	.55	1.0	.7	2.3	.75	3.0
16				2	.55	1.0	.55	1.0	.7	2.3	.75	3.0
17				2	.55	1.0	.7	2.3	.7	2.3		
18				2	.55	1.0	.7	2.3	.7	2.3		
19				2	.55	1.0	.6	1.2	.7	2.3		
20				2	.55	1.0	.6	1.2	.7	2.3		
21				2	.55	1.0	.6	1.2	.7	2.3		
22				1	.55	1.0	.6	1.2	.7	2.3		
23		455		1	.55	1.0	.6	1.2	.7	2.3		
24		455		1	.55	1.0	.6	1.2	.7	2.3		
25		455		1	.55	1.0	.55	1.0	.7	2.3		
26		455		0	.55	1.0	.55	1.0	.7	2.3		
27		455		0	.55	1.0	.55	1.0	.7	2.3		
28		455		0	.55	1.0	.55	1.0	.7	2.3		
29		455		0	.55	1.0	.55	1.0	.75	3.0		
30		455		0	.55	1.0	.55	1.0	.75	3.0		
31				0			.55	1.0				

NOTE.—High-water discharge determined by means of slope measurement and the use of Kutter's formula. No flow during June, July, and August.

Monthly discharge of Beaver Creek near Ladore, Colo., for 1910.

[Drainage area, 27 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 24–30			455	16.8	4.39	6,320
May			65.2	2.41	2.78	4,010
September	1.0	0.3	.82	.030	.03	49
October	2.3	1.0	1.12	.041	.05	69
November	3	1	2.01	.074	.08	119
December 1–16	3.0	3.0	3.0	.111	.07	101
The period						10,700

VERMILION CREEK NEAR LADORE, COLO.

This station, which is located near Bassett's ranch, about 5 miles from Ladore, Colo., was established August 29, 1910, by the State engineer of Colorado and is maintained by the State in cooperation

with Ward & Montgomery, of Denver. The records are furnished by the State engineer.

A vertical staff gage is spiked to an old bridge abutment.

A sandstone outcrop immediately below the station gives good control to the section. The stream channel is practically dry part of the year.

Low-stage measurements are made by wading. High-stage discharge is computed by means of Kutter's formula.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Vermilion Creek near Ladore, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 28	C. L. Chatfield	.....	563	6.85	[a]3,750
Aug. 29	do	5.5	.90	−1.90	.69
31	do	.....	.....	.....	[b]1.05
Oct. 28	do	.....	.....	.....	[b]5.0
29	do	.....	.....	.....	[b]4.5

[a] Discharge obtained by slope measurement and use of Kutter's formula. [b] Estimated.

Daily gage height, in feet, and discharge, in second-feet, of Vermilion Creek near Ladore, Colo., for 1910.

[E. Bassett, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	1	.....	21	.....	1	.....	1.5	.....	4.5
2	.....	1	.....	5	.....	1	.....	1.5	.....	4.5
3	.....	1	.....	3	.....	34	.....	1.5	.....	4.5
4	.....	1	.....	3	1.0	375	.....	1.5	.....	4.5
5	.....	1	.....	3	1.1	408	.....	1.5	.....	4.5
6	.....	1	.....	1	.1	128	.....	1.5	.....	4.5
7	.....	1	.....	1	.....	22	.....	1.5	.....	4.5
8	.....	1	.....	1	.....	3	.....	1.5	.....	4.5
9	.....	1	.....	1	.....	1.5	.....	1.5	.....	4.5
10	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.5
11	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
12	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
13	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
14	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
15	.....	1	.....	1	.....	1.5	.....	2.0	.....	4.0
16	.....	1	.....	1	.....	1.5	1.2	417	.....	4.0
17	.....	1	.....	1	.....	1.5	1.0	331	.....	4.0
18	.....	1	.....	1	.....	1.5	.2	156	.....	4.0
19	.....	1	.....	1	.....	1.5	.....	44	.....	4.0
20	.....	1	.....	1	.....	1.5	.....	9	.....	4.0
21	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
22	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
23	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
24	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
25	.....	1	.....	1	.....	1.5	.....	4	.....	4.0
26	.....	1	.....	1	.....	1.5	.....	4	0.35	181
27	.....	898	.....	1	.....	1.5	.....	4	.2	174
28	.....	2,680	.....	1	.....	1.5	.....	4.5	.....	132
29	.....	389	.....	1	.....	1.5	.....	5.0	.....	42
30	.....	161	.....	1	.....	1.5	.....	5.0	.....	3
31	.....	72	.....	1	.....	.....	.....	5.0	.....	.....

Monthly discharge of Vermilion Creek near Ladore, Colo., for 1910.

[Drainage area, 1,017 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
July	2,680	1	136	0.134	0.15	8,360
August	21	1	2.0	.002	.002	123
September	408	1.5	33.5	.033	.04	1,990
October	417	1.5	33	.032	.04	2,030
November	181	3	21	.021	.02	1,250
The period						13,800

YAMPA RIVER BASIN.

GENERAL FEATURES.

Yampa River rises in Egeria Park, in the southeastern part of Routt County, Colo., runs in a general northerly direction to Steamboat Springs, and thence westward to its point of junction with Green River, just east of the Colorado-Utah State boundary. Through almost its entire course it flows in a succession of open valleys alternating with deep, narrow canyons, the longest and deepest of the canyons being that through which it enters the Green.

The drainage basin of the river lies for the most part within the boundaries of Routt County, which is a little larger than the State of Massachusetts and comprises about 6,000 square miles. Its eastern limit is formed by the Park Mountains. Westward from the mountains the basin is largely the eroded and dissected Yampa Plateau, whose wide terraces, abrupt cliffs, and deep-cut gulches and arroyos are the striking features of the region. The general level is over 6,000 feet above sea.

Elk River, Fortification Creek, Elk Head Creek, William River, and Little Snake River are the most important tributaries of the Yampa. The upper basins of these streams are within the forested region, but along their lower courses are many cultivated areas.

YAMPA RIVER AT YAMPA, COLO.

This station, which is located at the footbridge on the road between Yampa River and the Denver, Northwestern & Pacific Railway station, was established May 17, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is spiked to the upstream side of the footbridge.

The current makes an angle of about 15 degrees with the bridge. The bed of the stream affords fair conditions for discharge measurements.

Discharge measurements are made from the downstream side of the wagon bridge just above the footbridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Yampa River at Yampa, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	C. L. Chatfield	14	13	.....	21.5
May 17	.....do	15	22	2.00	81
July 9	.....do	7.5	3.7	.90	2.0
26	.....do	.....	1.0	.70	1.1
Aug. 2	.....do	.....	5.0	1.00	4.0
Sept. 16	.....do	20	14	1.50	21
Oct. 14	.....do	16	7.2	1.08	4.9
Nov. 17	.....do	22	14	1.47	23

Daily gage height, in feet, of Yampa River at Yampa, Colo., for 1910.

[O. D. Sibold, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	0.95	0.9	1.55	1.2	1.4	1.4
2	.....	2.05	.9	1.0	1.5	1.25	1.4	1.45
3	.....	2.0	.95	1.0	1.45	1.2	1.35	1.4
4	.....	1.9	1.0	1.0	1.5	1.2	1.4	.....
5	.....	1.85	.95	1.0	1.5	1.15	1.45	.....
6	.....	1.9	.9	1.2	1.5	1.2	1.4	.....
7	.....	1.9	.9	1.45	1.5	1.15	1.4	.....
8	.....	1.9	.85	1.45	1.5	1.1	1.4	.....
9	.....	1.85	.9	1.5	1.55	1.1	1.35	.....
10	.....	1.9	.9	1.5	1.6	1.15	1.4	.....
11	.....	1.85	.9	1.55	1.6	1.1	1.4	.....
12	.....	1.9	.85	1.5	1.65	1.2	1.4	.....
13	.....	1.95	.85	1.5	1.6	1.2	1.5	.....
14	.....	2.0	.8	1.5	1.6	1.25	1.5	.....
15	.....	2.0	.8	1.45	1.6	1.2	1.4	.....
16	.....	2.0	.8	1.5	1.6	1.3	1.4	.....
17	1.9	1.8	.8	1.5	1.6	1.25	1.35	.....
18	1.9	1.85	.8	1.5	1.65	1.3	1.3	.....
19	2.0	1.8	.8	1.5	1.6	1.3	1.35	.....
20	2.1	1.7	.8	1.55	1.65	1.35	1.3	.....
21	2.0	1.6	.7	1.5	1.6	1.3	1.35	.....
22	2.1	1.55	.7	1.5	1.55	1.3	1.3	.....
23	1.9	1.5	.75	1.5	1.5	1.35	1.4	.....
24	1.9	1.45	.7	1.5	1.5	1.3	1.4	.....
25	2.0	1.2	.7	1.5	1.4	1.4	1.4	.....
26	1.95	1.05	.7	1.45	1.4	1.4	1.45	.....
27	1.9	1.0	.7	1.5	1.35	1.4	1.4	.....
28	1.95	1.0	.75	1.5	1.35	1.4	1.5	.....
29	1.95	1.0	.85	1.5	1.3	1.4	1.45	.....
30	1.9	1.0	.9	1.5	1.2	1.4	1.4	.....
31	1.9	.....	.9	1.5	.....	1.4	.....	.....

Daily discharge, in second-feet, of Yampa River at Yampa, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	80	2.6	1.8	26	9	17	17
2	.....	92	1.8	3.5	22	11	17	20
3	.....	80	2.6	3.5	20	9	15	17
4	.....	62	3.5	3.5	22	9	17	.....
5	.....	56	2.6	3.5	22	7.5	20	.....
6	.....	62	1.8	9	22	9	17	.....
7	.....	62	1.8	20	22	7.5	17	.....
8	.....	62	1.2	20	22	6	17	.....
9	.....	56	1.8	22	26	6	15	.....
10	.....	62	1.8	22	29	7.5	17	.....
11	.....	56	1.8	26	29	6	17	.....
12	.....	62	1.2	22	34	9	17	.....
13	.....	71	1	22	29	9	22	.....
14	.....	80	0.7	22	29	11	22	.....
15	.....	80	.7	20	29	9	17	.....
16	.....	80	.7	22	29	13	17	.....
17	62	49	.7	22	29	11	15	.....
18	62	56	.7	22	34	13	13	.....
19	80	49	.7	22	29	13	15	.....
20	104	38	.7	26	34	15	13	.....
21	80	29	.2	22	29	13	15	.....
22	104	26	.2	22	26	13	13	.....
23	62	22	.4	22	22	15	17	.....
24	62	20	.2	22	22	13	17	.....
25	80	9	.2	22	17	17	17	.....
26	71	4.8	.2	20	17	17	20	.....
27	62	3.5	.2	22	15	17	17	.....
28	71	3.5	.4	22	15	17	22	.....
29	71	3.5	1.2	22	13	17	20	.....
30	62	3.5	1.8	22	9	17	17	.....
31	62	.....	1.0	22	.....	17	.....	.....

Monthly discharge of Yampa River at Yampa, Colo., for 1910.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 17–31	104	62	73.0	1.40	0.78	2,170
June	92	3.5	47.3	.910	1.02	2,810
July	3 5	.2	1.21	.023	.03	74
August	26	1.8	18.5	.356	.41	1,140
September	34	9	24.1	.463	.52	1,430
October	17	6	11.7	.225	.26	719
November	22	13	17.1	.329	.37	1,020
The period	.....	.....	.....	.....	.....	9,370

YAMPA RIVER AT STEAMBOAT SPRINGS, COLO.

This station, which is located at the lower steel bridge at the Denver, Northwestern & Pacific Railway station, Steamboat Springs, Colo., was established March 3, 1910, by the State engineer of Colorado, by whom the records are furnished.

A standard chain gage and a Bristol automatic gage, both referred to the same datum, are attached to the bridge.

The bed of the stream is composed of cobbles and bowlders and is permanent. Conditions favor accurate measurements.

Discharge measurements are made at the steel bridge between the railroad station and the town.

The relation between gage height and discharge is little affected by ice, as the hot springs above the station tend to keep the river open most of the winter.

During 1904, a station was maintained on the Yampa at a highway bridge about three-quarters of a mile above the present station, and in 1905 a station was maintained at a point half a mile below the present site. The gages are, however, not referred to the same datum and the records are not comparable.

Discharge measurements of Yampa River at Steamboat Springs, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 3	C. L. Chatfield	80	93	0.20	120
8	do	105	163	.80	319
Apr. 10	do	112	234	1.45	713
May 12	do	108	420	3.30	2,440
18	do	108	317	2.30	1,380
June 30	do	95	124	.60	216
Aug. 3	do	82	88	.15	106
Oct. 10	Chatfield and Hezmalhalch	65	99	.03	78
Dec. 10	C. L. Chatfield	82	95	a .22	117

a New gage read 1.20 feet.

Daily gage height, in feet, of Yampa River at Steamboat Springs, Colo., for 1910.

[Dr. L. G. Blackmur, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.4	1.9	3.4	0.6	0.25	0.1	0.1	0.3	1.25
2	.....	1.5	2.0	3.35	.6	.25	.1	.1	.4	1.25
3	.....	1.3	2.2	3.3	.6	.15	.1	.0	.55	1.25
4	.....	1.25	2.2	3.15	.6	.1	.05	.1	.5	1.15
5	.....	1.35	2.4	2.95	.55	.15	.0	— .1	.35	1.05
6	.....	1.35	2.4	2.85	.45	.2	.05	— .15	.2	.95
7	.....	1.4	2.6	2.7	.5	.25	.05	— .05	.35	1.05
8	0.8	1.4	2.7	2.5	.4	.35	.05	.05	.45	1.0
9	.85	1.45	2.8	2.2	.2	.4	.05	.2	.35	1.15
10	.8	1.4	3.05	2.05	.15	.3	.0	.15	.2	1.2
11	.65	1.4	3.25	1.95	.1	.3	.1	.15	.15	.9
12	.65	1.4	3.25	1.85	.2	.3	.05	.1	.1	.....
13	.75	1.35	3.05	1.75	.15	.35	— .05	.1	.2	.....
14	.8	1.25	2.95	1.6	.15	.4	.15	.1	.2	.95
15	.85	1.2	2.9	1.45	.1	.4	.25	.15	1.2	.....
16	.95	1.3	2.6	1.4	.15	.35	.4	.25	1.2	.....
17	.95	1.3	2.45	1.4	.1	.35	.45	.3	1.2	.....
18	1.05	1.4	2.4	1.3	.1	.35	.5	.35	1.2	.....
19	1.15	1.5	2.5	1.15	.1	.3	.5	.25	1.25	.....
20	1.25	1.6	2.5	1.05	.1	.3	.5	.2	1.2	.....
21	1.35	1.65	2.4	1.0	.15	.3	.55	.1	1.2	1.0
22	1.45	1.7	2.3	.85	.15	.35	.45	.1	1.2	1.0
23	1.6	1.8	2.3	.75	.15	.4	.35	.25	1.2	1.0
24	1.5	1.8	2.5	.7	.1	.4	.25	.35	1.2	1.0
25	1.45	1.75	2.7	.65	.05	.2	.25	.5	1.2	1.0
26	1.4	1.8	2.75	.65	.1	.1	.05	.55	1.25	1.0
27	1.4	1.8	2.8	.65	.05	.15	— .05	.2	1.25	1.0
28	1.35	1.75	3.2	.65	.05	.1	— .05	.1	1.25	1.0
29	1.2	1.8	3.35	.6	.2	.1	— .05	.1	1.25	1.0
30	1.25	1.8	3.45	.6	.4	.1	— .05	.1	1.3	1.0
31	1.35	.....	3.5	.....	.35	.1	.....	.25	.....	1.0

NOTE.—Beginning Nov. 15, the gage heights refer to a different datum.

Daily discharge, in second-feet, of Yampa River at Steamboat Springs, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	120	675	1,050	2,560	239	130	93	93	143	130
2	120	745	1,130	2,500	239	130	93	93	171	130
3	120	605	1,300	2,440	239	105	93	73	221	130
4	159	572	1,300	2,262	239	93	83	93	203	105
5	198	640	1,475	2,035	221	105	73	57	157	83
6	238	640	1,475	1,928	187	117	83	51	117	65
7	278	675	1,660	1,770	203	130	83	65	157	83
8	323	675	1,770	1,565	171	157	83	83	187	73
9	347	710	1,875	1,300	117	171	83	117	157	95
10	323	675	2,148	1,172	105	143	73	105	117	117
11	259	675	2,380	1,090	93	143	93	105	105	57
12	259	675	2,380	1,010	117	143	83	93	93	57
13	301	640	2,148	932	105	157	65	93	117	57
14	323	572	2,035	820	105	171	105	93	117	65
15	347	540	1,980	710	93	171	130	105	117	65
16	397	605	1,660	675	105	157	171	130	117	65
17	397	605	1,520	675	93	157	187	143	117	65
18	451	675	1,475	605	93	157	203	157	117	65
19	510	745	1,565	510	93	143	203	130	130	65
20	572	820	1,565	451	93	143	203	117	117	65
21	640	858	1,475	423	105	143	221	93	117	73
22	710	895	1,385	347	105	157	187	93	117	73
23	820	970	1,385	301	105	171	157	130	117	73
24	745	970	1,565	279	93	171	130	157	117	73
25	710	932	1,770	259	83	117	130	203	117	73
26	675	970	1,822	259	93	93	83	221	130	73
27	675	970	1,875	259	83	105	65	117	130	73
28	640	932	2,320	259	83	93	65	93	130	73
29	540	970	2,500	239	117	93	65	93	130	73
30	572	970	2,622	239	171	93	65	93	143	73
31	640	.....	2,685	.....	157	93	.....	130	.....	73

Monthly discharge of Yampa River at Steamboat Springs, Colo., for 1910.

[Drainage area, 572 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March	820	120	433	0.757	0.87	26,600
April	970	540	753	1.32	1.47	44,800
May	2,680	1,050	1,780	3.11	3.59	110,000
June	2,560	239	996	1.74	1.94	59,300
July	239	83	134	.234	.27	8,240
August	171	93	134	.234	.27	8,240
September	221	65	115	.201	.22	6,840
October	221	51	110	.192	.22	6,760
November	221	93	134	.234	.26	7,970
December	103	57	78.7	.138	.16	4,840
The period	.....	.....	.....	.....	.....	284,000

YAMPA RIVER AT CRAIG, COLO.

This station, which is located at the steel highway bridge about 1 mile south of Craig, on the road to Hamilton, Colo., was established May 25, 1901, discontinued September 4, 1902, reestablished April 30, 1904, discontinued October 31, 1906, and again reestablished—this

time by the State engineer of Colorado—April 1, 1910. The records are furnished to the Survey by the State engineer.

A staff gage is bolted to an old pile at the south end of the bridge. The zero of the present gage is 0.35 foot higher than that of the original gage.

Discharge measurements are made from the bridge.

During the winter the relation between gage height and discharge is seriously affected by ice.

Discharge measurements of Yampa River at Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 15	C. L. Chatfield	152	962	4.85	2,860
May 21	do	162	1,110	5.30	3,390
June 10	do	152	1,030	4.90	2,980
Aug. 12	do	.....	695	2.30	138
Sept. 4	do	75	59	2.30	145
Oct. 24	do	95	106	2.50	258

Daily gage height, in feet, of Yampa River at Craig, Colo., for 1910.

[W. E. Pratt, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	6.15	6.5	3.05	2.55	2.2	2.4	2.5	2.6
2	4.2	5.85	6.3	3.0	2.45	2.3	2.4	2.55	2.5
3	4.55	5.45	6.25	2.95	2.45	2.3	2.5	2.5	2.5
4	4.5	5.3	6.1	2.95	2.4	2.3	2.65	2.5	.....
5	4.2	5.35	5.8	2.85	2.45	2.7	2.65	2.5	.....
6	4.0	5.4	5.7	2.65	2.3	2.75	2.55	2.5	.....
7	4.05	5.25	5.6	2.6	2.4	2.55	2.55	2.45	.....
8	4.15	5.2	5.3	2.55	2.4	2.45	2.5	2.4	.....
9	4.2	5.35	5.2	2.5	2.25	2.4	2.5	2.5	.....
10	4.45	5.8	4.85	2.4	2.3	2.35	2.45	2.5	.....
11	4.8	6.3	4.75	2.4	2.25	2.4	2.4	2.5	.....
12	4.95	6.4	4.65	2.35	2.35	2.35	2.45	2.5	.....
13	5.05	6.25	4.65	2.3	2.35	2.4	2.4	2.5	.....
14	5.2	6.15	4.6	2.25	2.35	2.45	2.35	2.5	.....
15	4.95	6.0	4.45	2.3	2.4	2.55	2.3	2.5	.....
16	4.45	5.8	4.25	2.35	2.35	2.65	2.4	2.5	.....
17	4.4	5.4	4.25	2.25	2.35	2.55	2.5	2.55	.....
18	4.65	5.25	4.15	2.3	2.3	2.6	2.65	2.6	.....
19	4.65	5.15	4.1	2.25	2.3	2.5	2.8	2.6	.....
20	5.2	5.25	3.9	2.25	2.35	2.5	2.65	2.6	.....
21	5.7	5.3	3.85	2.25	2.35	2.45	2.65	2.55	.....
22	5.45	5.1	3.75	2.25	2.35	2.45	2.55	2.55	.....
23	5.3	4.9	3.65	2.25	2.3	2.45	2.55	2.65	.....
24	5.5	5.0	3.6	2.25	2.3	2.5	2.6	2.7	.....
25	5.75	5.25	3.45	2.2	2.4	2.5	2.6	2.6	.....
26	5.9	5.55	3.25	2.15	2.3	2.45	2.6	2.6	.....
27	6.1	5.55	3.05	2.15	2.25	2.4	2.6	2.6	.....
28	6.25	5.85	3.05	2.25	2.25	2.4	2.6	2.55	.....
29	6.4	6.3	3.1	2.4	2.25	2.4	2.55	2.6	.....
30	6.35	6.4	3.1	2.55	2.2	2.4	2.55	2.6	.....
31	.....	6.4	.....	2.35	2.25	.....	2.5	.....	.....

Daily discharge, in second-feet, of Yampa River at Craig, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,740	5,120	5,870	662	292	95	200	260	325
2	1,860	4,505	5,435	620	230	145	200	292	260
3	2,320	3,745	5,330	580	230	145	260	260	260
4	2,250	3,480	5,015	580	200	145	360	260	.....
5	1,860	3,568	4,405	502	236	395	360	260	.....
6	1,620	3,655	4,210	360	145	330	292	260	.....
7	1,680	3,395	4,020	325	200	292	292	230	.....
8	1,800	3,310	3,480	292	200	230	260	200	.....
9	1,860	3,568	3,310	260	120	200	260	260	.....
10	2,182	4,405	2,755	200	145	172	230	260	.....
11	2,680	5,435	2,608	200	120	200	200	260	.....
12	2,908	5,650	2,462	172	172	172	230	260	.....
13	3,065	5,330	2,462	145	172	200	200	260	.....
14	3,310	5,120	2,390	120	172	230	172	260	.....
15	2,908	4,810	2,182	145	200	292	145	260	.....
16	2,182	4,405	1,922	172	172	360	200	260	.....
17	2,115	3,655	1,922	120	172	292	260	292	.....
18	2,462	3,395	1,800	145	145	325	360	325	.....
19	2,462	3,228	1,740	120	145	260	465	325	.....
20	3,310	3,395	1,505	120	172	260	360	325	.....
21	4,210	3,480	1,450	120	172	230	360	292	.....
22	3,745	3,145	1,340	120	172	230	292	292	.....
23	3,480	2,830	1,232	120	145	230	292	360	.....
24	3,835	2,985	1,180	120	145	260	325	395	.....
25	4,308	3,395	1,025	95	200	260	325	325	.....
26	4,605	3,928	835	72	145	230	325	325	.....
27	5,015	3,928	662	72	120	200	325	325	.....
28	5,330	4,505	662	120	120	200	325	292	.....
29	5,650	5,435	705	200	120	200	292	325	.....
30	5,542	5,650	705	292	95	200	292	325	.....
31	.....	5,650	.....	172	120	.....	260	.....	.....

Monthly discharge of Yampa River at Craig, Colo., for 1910.

[Drainage area, 1,730 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April	5,650	1,740	3,080	1.78	1.98	183,000
May	5,650	2,830	4,130	2.39	2.75	254,000
June	5,870	662	2,490	1.44	1.60	148,000
July	662	72	237	.137	.16	14,600
August	292	95	167	.097	.11	10,300
September	360	95	233	.135	.15	13,800
October	465	145	281	.162	.19	17,300
November	325	260	288	.166	.18	17,100
The period	.....	.....	.....	.....	.....	658,000

YAMPA RIVER NEAR MAYBELL, COLO.

This station, which is located at the Thornberg bridge, about 9 miles below Maybell, Colo., was established by the United States Geological Survey April 17, 1904, and discontinued October 31, 1905; it was reestablished June 12, 1910, by the State engineer of Colorado, by whom the records are furnished.

The chain gage is attached to the downstream handrail of the bridge. The datum of the new gage is identical with that of the old.

Discharge measurements are made from the bridge.

During the winter the relation of gage height to discharge is affected by ice.

Discharge measurements of Yampa River near Maybell, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	C. L. Chatfield	.....	1,040	3.90	3,120
Aug. 27	.....do	80	66	.40	159
Sept. 1	.....do	77	63	.35	137
Oct. 27	.....do	120	117	.85	319

Daily gage height, in feet, of Yampa River near Maybell, Colo., for 1910.

[Peter E. Farrell, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.75	0.7	0.3	0.35	0.6	0.8	16	3.55	1.0	0.4	0.45	0.4	0.65	.....
2	.....	1.7	.55	.35	.3	.65	.85	17	3.6	1.0	.4	.45	.45	.7	.....
3	.....	1.65	.45	.3	.35	.75	.9	18	3.45	.9	.35	.5	.6	.75	.....
4	.....	1.6	.4	.25	.3	.65	.....	19	3.15	.85	.35	.4	.8	.6	.....
5	.....	1.9	.45	.3	.4	.55	.....	20	3.05	.8	.3	.55	.85	.55	.....
6	.....	1.85	.5	.4	.45	.5	.....	21	3.0	.7	.35	.45	.9	.6	.....
7	.....	1.7	.4	.4	.5	.55	.....	22	2.8	.65	.3	.55	1.15	.65	.....
8	.....	1.5	.35	.45	.4	.6	.....	23	2.6	.6	.3	.35	1.1	.6	.....
9	.....	1.4	.3	.3	.35	.65	.....	24	2.45	.5	.3	.4	.85	.7	.....
10	.....	1.2	.25	.3	.3	.6	.....	25	2.3	.45	.25	.35	.75	.7	.....
11	.....	1.2	.2	.4	.3	.55	.....	26	2.3	.4	.3	.45	.8	.75	.....
12	4.8	1.05	.3	.35	.35	.5	.....	27	2.05	.6	.35	.3	.8	.7	.....
13	3.6	.95	.3	.3	.4	.45	.....	28	2.05	.65	.35	.45	.75	.65	.....
14	3.1	.85	.35	.4	.4	.55	.....	29	1.9	.7	.3	.5	.7	.8	.....
15	3.3	.85	.3	.5	.35	.6	.....	30	1.9	.85	.35	.6	.65	.9	.....
								31	.....	.85	.3	.....	.6	.....	.....

Daily discharge, in second-feet, of Yampa River near Maybell, Colo., for 1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	860	253	126	138	214	295	16	2,690	389	151	166	151	234	.....
2	.....	820	197	138	126	234	318	17	2,750	389	151	166	166	253	.....
3	.....	792	166	126	138	274	340	18	2,572	340	138	180	214	274	.....
4	.....	755	151	116	126	234	.....	19	2,235	318	138	151	295	214	.....
5	.....	985	166	126	151	197	.....	20	2,125	295	126	197	318	197	.....
6	.....	942	180	151	166	180	.....	21	2,070	253	138	166	340	214	.....
7	.....	820	151	151	180	197	.....	22	1,850	234	126	197	468	234	.....
8	.....	685	138	166	151	214	.....	23	1,640	214	126	138	441	214	.....
9	.....	618	126	126	138	234	.....	24	1,492	180	126	151	315	253	.....
10	.....	496	116	126	126	214	.....	25	1,350	166	116	138	274	253	.....
11	.....	496	105	151	126	197	.....	26	1,350	151	126	166	295	274	.....
12	4,340	415	126	138	138	180	.....	27	1,120	214	126	126	295	253	.....
13	2,750	364	126	126	151	165	.....	28	1,120	234	138	166	274	234	.....
14	2,180	318	138	151	151	197	.....	29	985	253	126	180	253	295	.....
15	2,400	318	126	180	138	214	.....	30	985	318	138	214	234	340	.....
								31	.....	318	126	.....	214	.....	.....

Monthly discharge of Yampa River near Maybell, Colo., for 1910.

[Drainage area, 3,670 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June 12-30	4,340	985	2,000	0.545	0.38	75,400
July	985	151	450	.123	.14	27,700
August	253	105	141	.038	.04	8,670
September	214	116	153	.042	.05	9,100
October	468	126	216	.059	.07	13,300
November	340	165	216	.059	.07	12,900
The period						147,000

TROUT CREEK AT PINNACLE, COLO.

This station, which is located at a wagon bridge one-fourth mile above Pinnacle, 11 miles from Dunkley, and 17 miles from Yampa, Colo., was established April 9, 1910, by the State engineer of Colorado and is maintained by the State in cooperation with the Williams River High Line Irrigation Co.

A rod gage is fastened to the left bank 10 feet below the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter the relation between gage height and discharge is affected by ice.

Discharge measurements of Trout Creek at Pinnacle, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 9	C. L. Chatfield	16	13	1.80	13.9
May 15	.....do	24	25	2.35	72
July 22	.....do	18	12	1.85	13.8
Aug. 9	.....do	18	12.2	1.90	13.8
Oct. 21	.....do	20	19	1.95	22

Daily gage height, in feet, of Trout Creek at Pinnacle, Colo., for 1910.

[Mrs. D. M. Chapman, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.25	3.25	2.15	1.9	1.8	1.8	1.65	1.8
2	.....	2.1	3.0	2.1	1.85	1.8	1.8	1.65	1.8
3	.....	2.15	3.1	2.1	1.85	1.9	1.8	1.6	1.8
4	.....	2.15	3.0	2.1	1.9	2.0	1.8	1.6	1.8
5	.....	2.1	3.0	2.05	1.9	1.9	1.8	1.6	1.9
6	.....	2.15	2.1	2.3	1.9	1.8	1.75	1.7	2.35
7	.....	2.2	3.1	2.25	1.9	1.8	1.7	1.75	2.3
8	.....	2.3	3.05	2.0	1.8	1.8	1.7	1.7	2.55
9	1.8	2.35	2.95	2.0	1.85	1.75	1.7	1.7	2.6
10	1.8	2.45	2.85	2.0	1.85	1.75	1.7	1.7	2.1
11	1.9	2.65	2.8	2.0	1.9	1.8	1.7	1.7	.....
12	1.9	2.45	2.8	1.9	2.0	1.85	1.7	1.75	.....
13	1.9	2.3	2.8	1.9	1.95	1.95	1.7	1.8	.....
14	1.9	2.4	2.75	1.9	1.9	2.0	1.7	1.8	.....
15	1.9	2.4	2.7	1.9	1.9	1.95	1.7	1.8	.....
16	1.85	2.4	2.55	1.9	1.9	1.85	1.7	1.75	.....
17	1.85	2.3	2.5	1.9	1.9	1.8	1.7	1.8	.....
18	1.9	2.25	2.45	1.9	1.9	1.9	1.7	1.75	.....
19	1.95	2.3	2.45	1.9	1.9	1.85	1.7	1.8	.....
20	2.0	2.3	2.5	1.9	1.9	1.8	1.7	1.85	.....
21	2.0	2.3	2.4	1.85	1.9	1.8	1.7	1.9	.....
22	1.95	2.3	2.4	1.85	1.85	1.8	1.75	1.9	.....
23	1.95	2.3	2.3	1.85	1.8	1.8	1.75	1.8	.....
24	2.05	2.3	2.3	1.85	1.8	1.8	1.75	1.9	.....
25	2.2	2.35	2.3	1.8	1.8	1.8	1.75	1.8	.....
26	2.25	2.4	2.2	1.8	1.8	1.8	1.7	1.8	.....
27	2.25	2.5	2.2	1.8	1.8	1.8	1.7	1.8	.....
28	2.3	2.9	2.25	1.9	1.8	1.8	1.7	1.8	.....
29	2.3	3.0	2.2	2.0	1.8	1.8	1.8	1.8	.....
30	2.3	3.2	2.2	2.0	1.8	1.8	1.75	1.8	.....
31	.....	3.35	.....	1.95	1.8	.....	1.7	.....	.....

Daily discharge, in second-feet, of Trout Creek at Pinnacle, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	55	316	42	18	12	12	4	12
2	.....	36	233	36	15	12	12	4	12
3	.....	42	264	36	15	18	12	2	12
4	.....	42	233	36	18	26	12	2	12
5	.....	36	233	31	18	18	12	2	.....
6	.....	42	264	62	18	12	9	6	.....
7	.....	48	264	55	18	12	6	9	.....
8	.....	62	248	26	12	12	6	6	.....
9	12	71	218	26	15	9	6	6	.....
10	12	78	188	26	15	9	6	6	.....
11	18	132	173	26	18	12	6	6	.....
12	18	79	173	18	26	15	6	9	.....
13	18	62	173	18	22	22	6	12	.....
14	18	79	159	18	18	26	6	12	.....
15	18	79	145	18	18	22	6	12	.....
16	15	79	109	18	18	15	6	9	.....
17	15	62	98	18	18	12	6	12	.....
18	18	55	88	18	18	18	6	9	.....
19	22	62	88	18	18	15	6	12	.....
20	26	62	98	18	18	12	6	15	.....
21	26	62	79	15	18	12	6	18	.....
22	22	62	79	15	15	12	9	18	.....
23	22	62	62	15	12	12	9	12	.....
24	31	62	62	15	12	12	9	18	.....
25	48	70	62	12	12	12	9	12	.....
26	55	79	48	12	12	12	6	12	.....
27	55	98	48	12	12	12	6	12	.....
28	62	202	55	18	12	12	6	12	.....
29	62	233	48	26	12	12	12	12	.....
30	62	299	48	26	12	12	9	12	.....
31	.....	354	.....	22	12	.....	6	.....	.....

NOTE.—Mean discharge Dec. 5-31, estimated at 12 second-feet.

Monthly discharge of Trout Creek at Pinnacle, Colo., for 1910.

[Drainage area, 27 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 9-30	62	12	29.8	1.10	0.90	1,300
May	354	36	91.8	3.40	3.92	5,640
June	316	48	145	5.37	5.99	8,630
July	42	12	24.3	.900	1.04	1,490
August	26	12	16.0	.592	.682	984
September	26	9	14.3	.530	.59	851
October	18	6	7.7	.285	.33	474
November	36	2	9.8	.370	.41	583
December			12.0	.445	.51	738
The period						20,700

SODA CREEK AT STEAMBOAT SPRINGS, COLO.

This station, which is located at a road bridge on Main Street, Steamboat Springs, was established June 8, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is fastened to the bridge.

The bed of the stream is composed of cobbles and is permanent. The current makes an angle of 35° with the bridge; a coefficient of 0.81 has been used in correcting the discharge estimates. The measuring section is good.

Discharge measurements are made from the bridge.

The relation of gage height to discharge is affected by ice during the winter.

Discharge measurements of Soda Creek at Steamboat Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	C. L. Chatfield	35	36	1.95	107
June 8	do	37	45	2.15	181
30	do	27	19	1.15	27
Aug. 3	do		3.3	.62	1.2

Daily gage height, in feet, and discharge, in second-feet, of Soda Creek at Steamboat Springs, Colo., for 1910.

[J. E. Milner, observer.]

Day.	June.		July.		August.		Day.	June.		July.		August.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	.....	26	.....	1.6	16	1.65	64	0.7	5	.....	2
2	.....	.....	.....	24	0.6	1.2	17	1.6	59	.....	5	.....	2
3	.....	.....	.....	22	.6	1.2	18	1.6	59	.....	5	.....	2
4	.....	.....	.....	20	.6	1.2	19	1.6	59	.....	5	.....	2
5	.....	.....	.....	18	.65	3.1	20	1.65	64	.....	4	.....	2
6	.....	.....	.....	16	.65	3.1	21	1.5	50	.....	4	.....	2
7	.....	.....	.....	14	.6	1.2	22	1.5	50	.....	4	.....	2
8	2.3	262	.....	12	.6	1.2	23	1.3	35	.65	3.1	.....	2
9	2.1	160	.....	12	.6	1.2	24	1.4	42	.....	3.1	.....	2
10	1.9	98	0.9	13	.6	1.2	25	1.3	35	.65	3.1	.....	2
11	2.0	121	.8	9	.6	1.2	26	1.35	38	.....	3.1	.....	2
12	1.9	98	.85	11	.7	5	27	1.2	29	.....	3.1	.....	2
13	1.85	90	.8	9	.7	5	28	1.1	23	.....	2.5	.....	2
14	1.8	82	.75	7	.6	1.2	29	1.2	29	.....	2.5	.....	2
15	1.7	69	.7	5	.....	2	30	1.15	26	.....	2.0	.....	2
							31	.....	.....	.....	2.0	.....	2

NOTE.—Discharge estimated for days on which gage heights are missing.

Monthly discharge of Soda Creek at Steamboat Springs, Colo., for 1910.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June 8–30	262	23	71.4	1.52	1.30	3,260
July	.....	.....	8.85	.188	.22	544
August	.....	.....	2.02	.043	.05	124
September	.....	.....	[a] 2.0	.043	.05	119
October	.....	.....	[a] 2.0	.043	.05	123
November	.....	.....	[a] 3.7	.079	.09	220
December	.....	.....	[a] 4.0	.085	.10	246
The period	.....	.....	.....	.....	.....	4,640

[a] Estimated.

ELK RIVER NEAR CLARK, COLO.

This station, which is located at Kinney's ranch, about 19½ miles from Steamboat Springs and 2 miles from Clark post office, was established May 1, 1910, and is maintained by the Elk River Canal Co.

The station is equipped with a gage similar to a standard chain gage.

The bed of the stream is composed of bowlders.

Discharge measurements have been made by the State engineer of Colorado, who has furnished the records.

Discharge measurements of Elk River near Clark, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 12	C. L. Chatfield	53	90	2.6	166
Nov. 15	do	48	52	1.9	57

Daily gage height, in feet, of Elk River near Clark, Colo., for 1910.

[Geo. B. Kinney, observer.]

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	5.3	5.1	3.1	2.4	16	4.0	4.2	2.4	1.8
2	4.8	5.2	2.9	2.4	17	4.0	3.8	2.5	1.9
3	4.7	5.4	2.8	2.4	18	4.1	3.8	2.5	2.0
4	4.6	5.5	2.8	2.4	19	4.0	3.7	2.5	2.0
5	4.9	5.0	2.8	2.4	20	3.9	3.6	2.5	2.0
6	4.6	4.9	2.7	2.4	21	3.8	3.5	2.5	1.9
7	4.4	5.1	2.7	2.4	22	4.1	3.3	2.5	1.8
8	3.1	6.0	2.6	2.4	23	4.2	3.3	2.4	1.9
9	3.1	4.0	2.6	2.2	24	4.8	3.3	2.4	1.9
10	3.1	4.2	2.6	2.2	25	4.9	3.2	2.4	2.0
11	3.6	4.0	2.6	2.2	26	5.0	3.3	2.4	2.0
12	3.6	4.1	2.5	2.0	27	5.1	3.3	2.4	1.9
13	3.6	4.0	2.5	2.0	28	5.3	3.2	2.4	1.9
14	4.7	4.5	2.5	1.9	29	5.4	3.3	2.4	1.8
15	3.9	4.0	2.4	1.9	30	5.3	3.2	2.4	1.9
					31	5.2	.....	2.4	2.0

Daily discharge, in second-feet, of Elk River near Clark, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1	1,865	1,640	300	125	16	725	860	125	46
2	1,340	1,750	238	125	17	725	610	144	57
3	1,250	1,985	212	125	18	790	610	144	68
4	1,165	2,115	212	125	19	725	555	144	68
5	1,435	1,535	212	125	20	665	505	144	68
6	1,165	1,435	188	125	21	610	460	144	57
7	1,005	1,640	188	125	22	790	375	144	46
8	300	2,850	165	125	23	860	375	125	57
9	300	725	165	93	24	1,340	375	125	57
10	300	860	165	93	25	1,435	335	125	68
11	505	725	165	93	26	1,535	375	125	68
12	505	790	144	68	27	1,640	375	125	57
13	505	725	144	68	28	1,865	335	125	57
14	1,250	1,085	144	57	29	1,985	375	125	46
15	665	725	125	57	30	1,865	335	125	57
					31	1,750	.....	125	68

Monthly discharge of Elk River near Clark, Colo., for 1910.

[Drainage area, 213 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May	1,980	300	1,060	4.98	5.74	65,200
June	2,850	335	915	4.30	4.80	54,400
July	300	125	157	.733	.84	9,650
August	125	46	78	.366	.42	4,800
September	.....	.....	a 36	.169	.19	2,140
October	.....	.....	a 57	.268	.31	3,500
November	.....	.....	a 57	.268	.30	3,390
The period	.....	.....	.....	.....	.....	143,000

a Estimated.

ELK RIVER NEAR TRULL, COLO.

This station, which is located at the steel bridge about 2 miles southeast of Trull on the road between Steamboat Springs and Hayden, Colo., was established May 2, 1904, by the United States Geological Survey, discontinued August 16, 1906, and reestablished March 24, 1910, by the State engineer of Colorado, by whom the records are furnished.

The original gage, a vertical rod, was replaced by a chain gage, installed at the same datum, June 22, 1904. The present chain gage is the same as that used by the United States Geological Survey. It is attached to the bridge, no change having been made either in the location or in the datum.

Discharge measurements are made from the bridge.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Elk River near Trull, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 11	C. L. Chatfield	115	267	7.00	976
May 12	.....do	115	454	8.50	2,280
June 7	.....do	115	378	7.88	1,640
July 11	.....do	85	109	5.55	216
Sept. 12	.....do	69	72	5.02	90
Nov. 12	.....do	68	70	5.05	81

Daily gage height, in feet, of Elk River near Trull, Colo., for 1910.

[Fred O. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	6.0	8.1	8.7	6.1	5.45	4.85	5.0	5.1	5.0
2	.....	6.3	7.8	8.6	5.95	5.4	4.9	5.0	5.1	4.9
3	.....	6.3	7.5	8.45	5.85	5.3	5.0	5.15	5.05	5.1
4	.....	6.0	7.55	8.3	5.8	5.2	5.8	5.1	5.05	.....
5	.....	5.95	7.8	8.1	6.0	5.2	5.55	5.1	4.95	.....
6	.....	6.1	7.55	8.0	5.8	5.2	5.3	5.05	4.95	.....
7	.....	6.2	7.35	8.1	5.75	5.1	5.2	5.05	5.0	.....
8	.....	6.3	7.4	8.0	5.65	5.1	5.1	5.05	5.0	.....
9	.....	6.6	7.7	7.8	5.6	5.1	5.05	5.05	5.1	.....
10	.....	6.9	8.2	7.55	5.5	5.05	5.0	5.05	5.05	.....
11	.....	7.1	8.5	7.55	5.5	5.05	5.0	5.05	5.0	.....
12	.....	7.4	8.5	7.6	5.4	5.1	5.15	5.0	5.0	.....
13	.....	7.5	8.4	7.65	5.35	5.15	5.35	5.0	5.0	.....
14	.....	7.5	8.1	7.5	5.4	5.15	5.5	5.0	5.0	.....
15	.....	7.0	8.0	7.4	5.3	5.15	5.3	5.0	5.0	.....
16	.....	6.7	7.6	7.3	5.3	5.1	5.2	5.0	5.0	.....
17	.....	6.7	7.4	7.1	5.35	5.0	5.15	5.2	5.0	.....
18	.....	7.1	7.3	7.05	5.35	5.0	5.15	5.25	5.0	.....
19	.....	7.5	7.45	7.0	5.3	5.0	5.1	5.2	5.1	.....
20	.....	7.8	7.5	6.0	5.4	4.95	5.1	5.1	4.9	.....
21	.....	7.85	7.6	6.8	5.3	5.0	5.1	5.1	5.0	.....
22	.....	7.45	7.25	6.7	5.3	5.0	5.1	5.1	5.1	.....
23	.....	7.55	7.2	6.5	5.3	5.0	5.1	5.1	5.05	.....
24	6.15	7.9	7.4	6.4	5.2	4.9	5.1	5.1	5.1	.....
25	6.45	8.1	7.65	6.3	5.15	4.9	5.05	5.1	5.1	.....
26	6.5	8.2	8.0	6.2	5.2	4.9	5.05	5.1	5.0	.....
27	6.3	8.4	7.8	6.2	5.15	4.85	5.05	5.1	5.1	.....
28	6.2	8.6	8.35	6.2	5.4	4.9	5.05	5.1	5.0	.....
29	6.1	8.6	8.7	6.2	5.55	4.9	5.0	5.0	5.05	.....
30	5.8	8.4	8.7	6.2	5.5	4.9	5.0	5.05	5.05	.....
31	5.9	.....	8.75	.....	5.4	4.85	.....	5.1	.....	.....

Daily discharge, in second-feet, of Elk River near Trull, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	405	1,850	2,530	495	180	57	73	91	73
2	.....	560	1,565	2,405	382	165	61	73	91	61
3	.....	560	1,320	2,228	338	140	73	103	82	75
4	.....	405	1,360	2,060	315	115	315	91	82	.....
5	.....	382	1,565	1,850	405	115	212	91	67	.....
6	.....	455	1,360	1,750	315	115	140	82	67	.....
7	.....	505	1,210	1,850	292	91	115	82	73	.....
8	.....	560	1,245	1,750	250	91	91	82	73	.....
9	.....	730	1,480	1,565	230	91	82	82	91	.....
10	.....	910	1,955	1,360	195	82	73	82	82	.....
11	.....	1,040	2,285	1,360	195	82	73	82	73	.....
12	.....	1,245	2,285	1,400	165	91	103	73	73	.....
13	.....	1,320	2,170	1,440	152	103	152	73	73	.....
14	.....	1,320	1,850	1,320	165	103	195	73	73	.....
15	.....	975	1,750	1,245	140	103	140	73	73	.....
16	.....	790	1,400	1,175	140	91	115	73	73	.....
17	.....	790	1,245	1,040	152	73	103	115	73	.....
18	.....	1,040	1,175	1,008	152	73	103	128	73	.....
19	.....	1,320	1,282	975	140	73	91	115	91	.....
20	.....	1,565	1,320	910	165	67	91	91	61	.....
21	.....	1,610	1,400	850	140	73	91	91	73	.....
22	.....	1,282	1,140	790	140	73	91	91	91	.....
23	.....	1,360	1,105	670	140	73	91	91	82	.....
24	480	1,655	1,245	615	115	61	91	91	91	.....
25	642	1,850	1,440	560	103	61	82	91	91	.....
26	670	1,955	1,750	505	115	61	82	91	73	.....
27	560	2,170	1,565	505	103	57	82	91	91	.....
28	505	2,405	2,115	505	165	61	82	91	73	.....
29	455	2,405	2,530	505	212	61	73	73	82	.....
30	315	2,170	2,530	505	195	61	73	82	82	.....
31	360	.....	2,592	.....	165	57	.....	91	.....	.....

Monthly discharge of Elk River near Trull, Colo., for 1910.

[Drainage area, 415 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March 24–31	670	315	498	1.20	0.36	7,900
April	2,400	382	1,190	2.87	3.20	70,800
May	2,590	1,100	1,640	3.95	4.55	101,000
June	2,530	505	1,240	2.99	3.34	73,800
July	405	103	203	.489	.56	12,500
August	180	57	89.1	.215	.25	5,480
September	315	57	107	.258	.29	6,370
October	128	73	87.5	.211	.24	5,380
November	91	61	78.8	.190	.21	4,690
The period						288,000

FISH CREEK AT DUNKLEY, COLO.

This station, which is located at the wagon bridge, one-fourth mile below Dunkley's ranch and one-half mile above Dunkley's reservoir dam site, was established April 8, 1910, by the State engineer of Colorado, and is maintained by the State in cooperation with the Williams River High Line Irrigation Co. The records are furnished by the State engineer.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Fish Creek at Dunkley, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 8	C. L. Chatfield	10	8.0	2.60	18.5
May 15	do	16	24	4.02	51
July 21	do	.....	1.2	1.80	1.2
Oct. 22	do	12	3.6	2.22	5.9

Daily gage height, in feet, of Fish Creek at Dunkley, Colo., for 1910.

[R. S. Bird, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.6	3.35	2.0	2.0	1.9	2.0	2.3	2.3
2	.....	4.45	3.25	1.95	2.0	1.9	2.15	2.2	2.3
3	.....	4.55	3.0	2.0	2.0	2.0	2.2	2.2	2.3
4	.....	4.95	2.85	2.1	2.0	2.3	2.1	2.2	2.3
5	.....	4.55	2.6	2.05	2.0	2.25	2.15	2.2	2.3
6	.....	4.6	2.45	2.0	1.95	2.1	2.1	2.1	2.2
7	.....	4.25	2.4	2.0	2.0	2.0	2.15	2.2	2.25
8	2.6	4.5	2.35	1.95	2.0	2.0	2.05	2.2	2.3
9	2.7	4.45	2.4	1.95	1.9	2.0	2.2	2.3	2.2
10	2.9	4.9	2.35	1.95	2.0	1.9	2.2	2.2	2.2
11	3.1	5.95	2.3	1.9	1.95	1.9	2.2	2.2	.....
12	3.25	6.0	2.15	1.9	2.0	2.0	2.2	2.2	.....
13	3.2	5.8	2.2	1.9	1.9	2.0	2.2	2.2	.....
14	3.1	5.4	2.2	1.95	1.9	2.0	2.2	2.3	.....
15	2.75	4.75	2.1	1.9	2.0	2.0	2.2	2.2	.....
16	2.65	3.75	2.1	1.9	2.0	2.0	2.35	2.2	.....
17	2.75	3.75	2.1	1.95	1.9	2.0	2.4	2.3	.....
18	3.1	3.55	2.1	1.9	1.9	2.0	2.3	2.15	.....
19	3.4	3.9	2.05	1.9	1.9	2.1	2.2	2.3	.....
20	4.35	3.4	2.0	1.9	1.9	2.0	2.2	2.3	.....
21	4.4	3.35	2.0	1.9	2.0	2.0	2.1	2.2	.....
22	3.75	3.5	2.0	1.9	1.95	2.0	2.0	2.2	.....
23	3.95	3.4	2.0	1.9	1.9	1.95	2.1	2.2	.....
24	4.4	3.4	1.95	1.9	1.9	2.0	2.05	2.2	.....
25	4.9	3.4	1.9	1.9	1.9	2.0	2.1	2.2	.....
26	5.6	3.6	1.95	1.9	1.9	2.0	2.1	2.2	.....
27	5.8	3.4	1.95	1.9	1.95	2.0	2.0	2.2	.....
28	5.8	3.8	2.0	2.1	1.9	2.0	2.1	2.25	.....
29	6.0	3.5	2.0	2.3	1.95	2.0	2.1	2.30	.....
30	4.95	3.45	2.0	2.45	1.9	2.0	2.3	2.2	.....
31	.....	3.35	.....	2.0	1.9	.....	2.25	.....	.....

Daily discharge, in second-feet, of Fish Creek at Dunkley, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	70	33.5	6	3.2	2.2	3.2	6.7	6.7
2	.....	65	31	5	3.2	2.2	4.9	5.5	6.7
3	.....	68.5	26	6	3.2	3.2	5.5	5.5	6.7
4	.....	84	23	7	3.2	6.7	4.3	5.5	6.7
5	.....	68.5	19	6	3.2	6.1	4.9	5.5	6.7
6	.....	70	16.5	4.5	2.7	4.3	4.3	4.3	5.5
7	.....	58	16	4.5	3.2	3.2	4.9	5.5	6.1
8	19	67	15	4	3.2	3.2	3.8	5.5	6.7
9	20	65	16	4	2.2	3.2	5.5	6.7	6.1
10	24	82	15	4	3.2	2.2	5.5	5.5	5.5
11	28	128	14	2.5	2.7	2.2	5.5	5.5	[a] 5.5
12	31	131	11.5	2.5	3.2	3.2	5.5	5.5	5.5
13	30	121	12	2.5	2.2	3.2	5.5	5.5	5.5
14	28	102	12	3.0	2.2	3.2	5.5	6.7	5.5
15	21	76	11	2.5	3.2	3.2	5.5	5.5	5.5
16	19.5	43.5	10	2.2	3.2	3.2	7.4	5.5	5.5
17	21	43.5	10	2.7	2.2	3.2	8.0	6.7	5.5
18	28	38.5	10	2.2	2.2	3.2	6.7	4.9	5.5
19	35	47	9.5	2.2	2.2	4.3	5.5	6.7	5.5
20	61.5	35	9	2.2	2.2	3.2	5.5	6.7	5.5
21	63	33.5	8	2.2	3.2	3.2	4.3	5.5	5.0
22	43.5	37	8	2.2	2.7	3.2	3.2	5.5	5.0
23	48.5	35	8	2.2	2.2	2.7	4.3	5.5	5.0
24	63	35	7.5	2.2	2.2	3.2	3.8	5.5	5.0
25	82	35	7	2.2	2.2	3.2	4.3	5.5	5.0
26	111	40	6.5	2.2	2.2	3.2	4.3	5.5	5.0
27	121	35	6.5	2.2	2.7	3.2	3.2	5.5	5.0
28	121	45	7.0	4.3	2.2	3.2	4.3	6.1	5.0
29	131	37	7.0	6.7	2.7	3.2	4.3	6.7	5.0
30	84	36	7.0	8.6	2.2	3.2	6.7	5.5	5.0
31	.....	33.5	.....	3.2	2.2	.....	6.1	.....	5.0

[a] Dec. 11–31, discharge estimated.

Monthly discharge of Fish Creek at Dunkley, Colo., for 1910.

[Drainage area, 29 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 8–30	131	19	53.7	1.86	1.59	2,460
May	131	33.5	60.2	2.07	2.38	3,700
June	33.5	6.5	13.1	.448	.50	780
July	8.6	2.2	5.00	.172	.20	307
August	3.2	2.2	2.67	.093	.11	164
September	6.7	2.2	3.33	.114	.13	198
October	8	3.2	5.03	.176	.20	309
November	6.7	4.3	5.73	.197	.22	341
December			5.45	.188	.22	335
The period						8,590

ELK HEAD CREEK NEAR CRAIG, COLO.

This station, which is located at a wagon bridge at Harrison's ranch, about 6 miles above Craig, Colo., on the road from Steamboat Springs to Craig, was established by the United States Geological Survey, April 27, 1906, discontinued September 2, 1906, and reestablished April 15, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the bridge. The location and datum of the present gage are identical with those of the original gage.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Elk Head Creek near Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 6	C. L. Chatfield				45
Apr. 15	do	39	128	6.70	361
May 26	Chatfield and Burke	38	76	5.93	204
June 9	C. L. Chatfield	27	76	4.80	60
Sept. 4	do	8	2.5	3.80	.8
Nov. 3	do	15	6.3	4.07	7.2

Daily gage height, in feet, of Elk Head Creek near Craig, Colo., for 1910.

[U. F. Harrison, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	8.3	5.6	3.9	3.95	3.6	4.0	4.1	4.0
2	.....	7.9	5.5	3.85	3.8	3.6	4.0	4.1	4.0
3	.....	7.3	5.35	3.8	3.9	3.8	4.0	4.1	4.0
4	.....	7.4	5.3	3.8	3.8	3.75	4.0	4.05	4.0
5	.....	7.75	5.15	3.8	3.8	3.65	4.1	4.0	4.0
6	.....	7.15	5.05	3.8	3.8	3.6	4.1	4.0	.....
7	.....	7.2	4.95	3.8	3.8	3.75	4.0	3.9	.....
8	.....	7.15	4.85	3.8	3.8	3.9	4.0	3.9	.....
9	.....	7.2	4.8	3.8	3.8	3.8	4.0	3.9	.....
10	.....	7.7	4.7	3.8	3.8	3.8	4.0	4.0	.....
11	.....	7.85	4.75	3.7	3.8	3.8	4.0	4.0	.....
12	.....	7.7	4.7	3.75	3.8	3.8	4.0	4.0	.....
13	.....	7.25	4.45	3.8	3.75	3.9	4.0	4.0	.....
14	.....	6.95	4.35	3.8	3.8	3.9	4.0	4.0	.....
15	.....	6.6	4.3	3.8	3.7	3.85	4.0	4.0	.....
16	.....	6.7	4.3	3.85	3.7	3.8	4.0	4.0	.....
17	6.55	6.45	4.25	3.8	3.7	3.9	4.25	4.1	.....
18	7.4	6.35	4.3	3.8	3.7	3.9	4.45	4.1	.....
19	7.75	6.0	4.3	3.9	3.65	3.9	4.3	4.1	.....
20	8.5	6.15	4.2	3.85	3.7	5.9	4.3	4.1	.....
21	9.6	6.4	4.0	3.85	3.7	3.9	4.25	4.1	.....
22	7.95	6.25	3.9	3.85	3.7	3.95	4.2	4.1	.....
23	7.7	6.05	3.9	3.85	3.6	3.9	4.15	4.1	.....
24	8.95	5.9	3.9	3.9	3.6	3.95	4.1	4.1	.....
25	9.35	6.05	3.8	3.85	3.6	4.0	4.1	4.1	.....
26	9.15	5.9	3.8	3.8	3.6	4.0	4.1	4.1	.....
27	9.55	5.8	3.8	3.8	3.6	4.0	4.1	4.1	.....
28	9.75	5.85	3.8	4.05	3.6	4.0	4.1	4.1	.....
29	9.45	5.8	4.0	4.4	3.6	4.0	4.1	4.0	.....
30	8.7	5.75	3.8	4.05	3.6	4.0	4.1	4.0	.....
31	.....	5.7	.....	3.95	3.6	.....	4.1	.....	.....

Daily discharge, in second-feet, of Elk Head Creek near Craig, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	700	163	3	4	0	6	10	6
2	.....	610	148	2	1	0	6	10	6
3	.....	483	127	1	3	1	6	10	6
4	.....	504	120	1	1	0.8	6	8	6
5	.....	578	100	1	1	0.2	10	6	6
6	.....	452	88	1	1	0	10	6	.....
7	.....	462	75	1	1	0.8	6	3	.....
8	.....	452	64	1	1	3	6	3	.....
9	.....	462	59	1	1	1	6	3	.....
10	.....	567	50	1	1	1	6	6	.....
11	.....	599	54	0.5	1	1	6	6	.....
12	.....	567	50	1	1	1	6	6	.....
13	.....	472	30	1	0.8	3	6	6	.....
14	.....	412	24	1	1	3	6	6	.....
15	.....	342	21	1	0.5	2	6	6	.....
16	.....	362	21	2	0.5	1	6	6	.....
17	332	312	18	1	0.5	3	18	10	.....
18	504	294	21	1	0.5	3	30	10	.....
19	578	229	21	3	0.2	3	21	10	.....
20	746	256	15	2	0.5	3	21	10	.....
21	1,019	303	6	2	0.5	3	18	10	.....
22	621	274	3	2	0.5	4.5	15	10	.....
23	567	238	3	2	0	3	12	10	.....
24	854	212	3	3	0	4.5	10	10	.....
25	954	238	1	2	0	6	10	10	.....
26	904	212	1	1	0	6	10	10	.....
27	1,006	195	1	1	0	6	10	10	.....
28	1,058	204	1	8	0	6	10	10	.....
29	980	195	6	27	0	6	10	6	.....
30	794	187	1	8	0	6	10	6	.....
31	.....	179	.....	4.5	0	.....	10	.....	.....

Monthly discharge of Elk Head Creek near Craig, Colo., for 1910.

[Drainage area, 249 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 17–30	1,060	332	780	3.13	1.63	21,700
May	700	179	372	1.49	1.72	22,900
June	163	1	43.2	.173	.193	2,570
July	27	.5	2.81	.011	.01	173
August	4	0	.73	.003	.003	45
September	6	0	2.73	.011	.01	162
October	30	6	10.3	.041	.05	633
November	10	3	7.8	.031	.04	464
The period						48,600

FORTIFICATION CREEK AT CRAIG, COLO.

This station, which is located at a steel bridge one-eighth mile east of Main Street at Craig, Colo., on the road to Hayden and Steamboat Springs, was established by the United States Geological Survey, June 12, 1905, discontinued June 30, 1906, and reestablished March 5, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the downstream side of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

During the winter months the relation between gage height and discharge is affected by ice.

Discharge measurements of Fortification Creek at Craig, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 5	C. L. Chatfield	51	100	[a] 7.25	177
10	Foote and Burke	.....	.....	[a] 7.55	201
13	E. S. Foote	50	.....	7.75	411
Apr. 15	C. L. Chatfield	48	74	5.40	145
May 26	Chatfield and Burke	47	30	3.72	50
June 10	C. L. Chatfield	.....	.....	.....	[b] .5
29	.....do.....	.....	.....	.....	[b] .3
Sept. 4	.....do.....	14	11	3.25	14
Nov. 3	.....do.....	7	2.8	2.6	2.9

[a] Gage height affected by ice.

[b] Estimated.

Daily gage height, in feet, of Fortification Creek at Craig, Colo., for 1910.

[Mrs. E. L. Jamason, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.6	5.25	3.7	.....	.....	.....	.....	2.7	2.75
2	.....	4.8	5.25	3.6	.....	.....	.....	.....	2.6	2.9
3	.....	4.85	4.7	3.85	.....	.....	.....	.....	2.7	2.8
4	.....	4.45	4.65	3.75	.....	.....	3.25	.....	2.7	2.8
5	7.25	4.25	4.7	.....	.....	.....	3.2	.....	2.7	2.9
6	7.95	4.3	4.9	.....	.....	.....	3.2	.....	2.8	3.1
7	8.45	4.3	4.5	.....	.....	.....	3.2	.....	2.65	2.9
8	9.0	4.4	4.75	.....	.....	.....	.....	.....	2.6	2.7
9	8.5	5.05	4.55	.....	.....	.....	.....	.....	2.55	2.9
10	7.05	5.8	4.6	.....	.....	.....	.....	.....	2.5	2.9
11	6.5	5.75	4.95	.....	.....	.....	.....	.....	2.5	3.0
12	6.8	6.4	5.2	.....	.....	.....	.....	.....	2.55	3.1
13	7.75	5.85	4.55	.....	.....	.....	.....	.....	2.65	3.0
14	6.9	6.0	4.35	.....	.....	.....	.....	.....	2.6	3.0
15	6.5	4.8	4.25	.....	.....	.....	.....	2.85	2.65	2.95
16	6.5	3.6	4.1	.....	.....	.....	.....	2.8	2.7	.....
17	7.1	4.25	3.95	.....	.....	.....	.....	3.0	2.6	.....
18	6.8	4.3	3.85	.....	.....	.....	.....	3.25	2.6	.....
19	7.1	5.2	3.65	.....	.....	.....	.....	3.3	2.6	.....
20	7.4	4.65	3.5	.....	.....	.....	.....	3.05	2.9	.....
21	8.0	5.9	3.65	.....	.....	.....	.....	2.9	2.8	.....
22	7.4	5.85	3.6	.....	.....	.....	.....	2.8	3.0	.....
23	8.3	5.95	3.65	.....	.....	.....	.....	2.8	2.7	.....
24	5.9	5.4	3.65	.....	.....	.....	.....	2.8	2.7	.....
25	5.9	5.7	3.7	.....	.....	.....	.....	2.8	2.7	.....
26	5.0	5.75	3.7	.....	.....	.....	.....	2.8	2.6	.....
27	4.9	5.8	3.6	.....	.....	.....	.....	2.8	2.75	.....
28	4.75	5.85	3.55	.....	3.2	.....	.....	2.85	2.8	.....
29	4.6	5.8	3.6	.....	4.0	.....	.....	2.85	2.7	.....
30	4.1	5.5	3.8	.....	3.2	.....	.....	2.8	2.6	.....
31	4.4	.....	3.85	.....	.....	.....	.....	2.8	.....	.....

Daily discharge, in second feet, of Fortification Creek at Craig, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	95	136	30	.....	.....	.....	.....	4.5	5.2
2	.....	106	136	22	.....	.....	.....	.....	3.5	7.5
3	.....	109	100	25	.....	.....	.....	.....	4.5	6
4	.....	87	98	17	.....	.....	14	.....	4.5	6
5	178	76	100	10	.....	.....	13	.....	4.5	7.5
6	247	78	112	5	.....	.....	13	.....	6	11
7	306	78	90	1.5	.....	.....	13	.....	4	7.5
8	380	84	103	1.0	.....	.....	.....	.....	3.5	4.5
9	312	122	92	1.0	.....	.....	.....	.....	3	7.5
10	160	177	95	.5	.....	.....	.....	.....	2.5	7.5
11	120	173	115	.5	.....	.....	.....	.....	2.5	9
12	140	234	132	.5	.....	.....	.....	.....	3	11
13	411	181	92	.5	.....	.....	.....	.....	4	9
14	290	194	80	.5	.....	.....	.....	.....	3.5	9
15	245	106	76	.5	.....	.....	.....	6.8	4	8.2
16	245	45	68	.5	.....	.....	.....	6	4.5	.....
17	315	76	60	.5	.....	.....	.....	9	3.5	.....
18	278	78	56	.5	.....	.....	.....	14	3.5	.....
19	315	132	47	.5	.....	.....	.....	15	3.5	.....
20	358	98	42	.5	.....	.....	.....	10	7.5	.....
21	452	185	47	.3	.....	.....	.....	7.5	6	.....
22	358	181	45	.3	.....	.....	.....	6	9	.....
23	507	190	47	.3	.....	.....	.....	6	4.5	.....
24	185	146	47	.3	.....	.....	.....	6	4.5	.....
25	185	169	49	.3	.....	.....	.....	6	4.5	.....
26	118	173	49	.3	.....	.....	.....	6	3.5	.....
27	112	177	45	.3	.....	.....	.....	6	5.2	.....
28	103	181	44	.3	13	.....	.....	6.8	6	.....
29	95	177	41	.3	38	.....	.....	6.8	4.5	.....
30	68	153	44	.3	13	.....	.....	6	3.5	.....
31	84	.....	41	.....	.....	.....	.....	6	.....	.....

NOTE.—Discharge estimated June 5–30. No flow July 1–27, July 31 to Sept. 3, and Sept. 8 to Oct. 14.

Monthly discharge of Fortification Creek at Craig, Colo., for 1910.

[Drainage area, 256 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March 5–31	507	68	243	0.949	0.95	13,000
April	234	45	135	.527	.59	8,030
May	136	41	75.1	.293	.34	4,620
June	30	3	4.03	.016	.02	240
July	38	0	2.06	.008	.01	127
August	0	0	0	0	0	0
September	14	0	1.77	.007	.01	105
October	14	0	4.19	.016	.02	258
November	9	3.5	4.34	.017	.02	258
December 1–15	11	4.5	7.76	.030	.02	231
The period						26,900

WILLIAMS RIVER NEAR PYRAMID, COLO.

This station, which is located at a footbridge at Dunston's ranch, 3 miles below Pyramid post office, was established April 14, 1910, by the State engineer of Colorado in cooperation with the Williams River High Line Irrigation Co. The records are furnished by the State engineer.

A vertical staff gage is bolted to the crib pier of the footbridge.

The bed of the stream is composed of bowlders and gravel and is probably permanent. The left bank is overflowed at high water. The measuring section is good.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Williams River near Pyramid, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 14	C. L. Chatfield	26	50	1.80	132
May 16	do	38	79	2.30	313
Aug. 10	do	28	45	1.50	51
Oct. 23	do	28	42	1.43	40

Daily gage height, in feet, of Williams River near Pyramid, Colo., for 1910.

[Edna B. Evans, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.4	2.95	1.75	1.65	1.4	1.4	1.35	1.4
2		2.35	3.05	1.75	1.6	1.4	1.4	1.35	1.45
3		2.4	3.1	1.7	1.55	1.45	1.4	1.35	1.3
4		2.4	2.95	1.7	1.6	1.45	1.4	1.4	1.35
5		2.2	2.8	1.65	1.55	1.5	1.4	1.45	1.45
6		2.15	2.9	1.75	1.5	1.5	1.4	1.35	1.35
7		2.2	2.85	1.75	1.5	1.4	1.4	1.35	1.5
8		2.2	2.75	1.7	1.5	1.4	1.4	1.35	1.45
9		2.3	2.6	1.7	1.5	1.4	1.4	1.35	1.35
10		2.7	2.55	1.7	1.5	1.4	1.4	1.35	1.35
11		3.1	2.6	1.7	1.5	1.4	1.4	1.35	1.3
12		2.95	2.55	1.6	1.55	1.5	1.4	1.35	1.3
13		2.9	2.55	1.5	1.5	1.7	1.4	1.35	1.3
14	1.8	2.55	2.55	1.5	1.5	1.5	1.4	1.3	1.25
15	1.75	2.45	2.45	1.5	1.5	1.5	1.4	1.4	1.25
16	1.7	2.35	2.4	1.5	1.5	1.6	1.4	1.35	1.3
17	1.7	2.2	2.35	1.5	1.5	1.6	1.5	1.3	1.15
18	1.8	2.25	2.35	1.65	1.5	1.5	1.5	1.35	1.25
19	1.9	2.25	2.3	1.6	1.5	1.5	1.5	1.3	1.3
20	2.0	2.25	2.3	1.6	1.5	1.5	1.35	1.35	1.25
21	1.95	2.2	2.2	1.6	1.5	1.5	1.4	1.4	1.25
22	1.9	2.15	2.1	1.6	1.5	1.4	1.45	1.35	1.35
23	1.8	2.4	2.0	1.6	1.5	1.4	1.45	1.35	1.3
24	1.9	2.45	1.95	1.6	1.5	1.4	1.45	1.35	1.25
25	2.15	2.45	1.95	1.6	1.5	1.4	1.45	1.35	.....
26	2.2	2.5	2.0	1.6	1.5	1.4	1.45	1.3	.....
27	2.6	2.6	1.95	1.65	1.5	1.4	1.35	1.25	.....
28	2.7	2.75	1.95	1.75	1.5	1.4	1.3	1.4	.....
29	2.55	2.75	1.95	1.8	1.4	1.4	1.45	1.35	.....
30	2.2	2.95	1.8	1.7	1.45	1.4	1.4	1.3	.....
31	.....	3.05	.....	1.65	1.4	.....	1.35	.....	.....

Daily discharge, in second-feet, of Williams River near Pyramid, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		361	678	113	86	35	35	29	35
2		338	751	113	73	35	35	29	43
3		361	790	99	62	43	35	29	23
4		361	678	99	73	43	35	35	29
5		272	578	86	62	51	35	43	43
6		252	643	113	51	51	35	29	29
7		272	610	113	51	35	35	29	51
8		272	548	99	51	35	35	29	43
9		315	462	99	51	35	35	29	29
10		518	436	99	51	35	35	29	29
11		790	462	99	51	35	35	29	23
12		678	436	73	51	51	35	29	23
13		643	436	51	51	99	35	29	23
14	128	436	436	51	51	51	35	23	19
15	114	385	385	51	51	51	35	35	19
16	99	338	361	51	51	73	35	29	23
17	99	272	338	51	51	73	51	23	13
18	128	294	338	86	51	51	51	29	19
19	160	294	315	73	51	51	51	23	23
20	195	294	315	73	51	51	29	29	19
21	178	272	272	73	51	51	35	35	19
22	160	252	232	73	51	35	43	29	29
23	128	361	195	73	51	35	43	29	23
24	160	385	178	73	51	35	43	29	19
25	252	385	178	73	51	35	43	29	[a]21
26	272	410	195	73	51	35	43	23	21
27	462	462	178	86	51	35	29	19	21
28	518	548	178	113	51	35	23	35	21
29	436	548	178	128	35	35	43	29	21
30	272	678	128	99	43	35	35	23	21
31	.....	751	.....	86	35	.....	29	.....	21

[a] Discharge Dec. 25–31, estimated.

Monthly discharge of Williams River near Pyramid, Colo., for 1910.

[Drainage area, 98 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 14–30	518	99	221	2.26	1.43	7,450
May	790	252	413	4.21	4.85	25,400
June	790	128	397	4.05	4.52	23,600
July	128	51	85.2	.869	1.00	5,240
August	86	35	53.0	.541	.62	3,260
September	99	35	45.0	.459	.51	2,680
October	51	23	37.1	.379	.44	2,280
November	43	19	28.9	.295	.33	1,720
December	51	13	25.6	.261	.30	1,570
The period						73,200

WILLIAMS RIVER AT HAMILTON, COLO.

This station, which is located on the steel wagon bridge on the stage road between Craig and Meeker, three-fourths of a mile north of Hamilton post office, about 14 miles from Craig, Colo., was established by the United States Geological Survey April 29, 1904, discontinued October 31, 1906, and reestablished April 15, 1910, by the State engineer of Colorado, by whom the records are furnished.

A standard chain gage is attached to the bridge. The datum of the present gage is 0.18 foot lower than the datum of the original gage.

The bed of the stream consists of gravel and some small bowlders and is probably permanent. The measuring section is good.

Discharge measurements are made from the downstream side of the bridge.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of Williams River at Hamilton, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 15	C. L. Chatfield	58	132	4.10	332
May 25	do	63	207	5.28	706
June 28	do	56	101	3.50	202
Aug. 12	do	30	33	2.65	51
Oct. 23	do	30	34	2.78	68.5

Daily gage height, in feet, of Williams River at Hamilton, Colo., for 1910.

[Carrie A. Hamilton, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.75	6.45	3.4	2.8	2.55	2.7	2.7	2.65
2	.....	5.3	6.4	3.35	2.8	2.55	2.7	2.75	2.7
3	.....	5.05	6.4	3.3	2.75	2.6	2.8	2.75	2.7
4	.....	5.2	6.3	3.2	2.75	2.9	2.7	2.75	.....
5	.....	5.45	6.05	3.35	2.75	3.05	2.7	2.75	.....
6	.....	5.15	5.7	3.3	2.7	2.8	2.7	2.65	.....
7	.....	5.05	5.7	3.15	2.7	2.7	2.7	2.65	.....
8	.....	5.25	5.6	3.0	2.7	2.65	2.7	2.65	.....
9	.....	5.8	5.35	3.0	2.7	2.6	2.7	2.65	.....
10	.....	6.55	5.2	3.0	2.65	2.6	2.7	2.65	.....
11	.....	7.1	4.95	2.9	2.7	2.6	2.7	2.65	.....
12	.....	6.9	4.95	2.9	2.6	2.7	2.7	2.65	.....
13	.....	6.3	4.95	3.0	2.7	2.75	2.7	2.7	.....
14	.....	5.85	4.85	2.8	2.7	2.75	2.7	2.7	.....
15	4.05	5.85	4.7	2.9	2.7	2.9	2.7	2.7	.....
16	3.85	5.4	4.6	3.0	2.65	2.8	2.7	2.7	.....
17	3.9	5.1	4.55	2.95	2.65	2.9	2.7	2.7	.....
18	4.1	5.0	4.4	3.0	2.6	2.8	2.85	2.7	.....
19	4.45	4.95	4.35	2.85	2.6	2.8	3.0	2.7	.....
20	4.9	5.05	4.3	2.8	2.6	2.7	2.95	2.75	.....
21	5.35	5.2	4.2	2.8	2.65	2.7	2.9	2.65	.....
22	4.85	4.9	4.1	2.8	3.15	2.8	2.7	2.85	.....
23	4.7	4.9	4.0	2.8	2.75	2.8	2.7	2.8	.....
24	5.0	5.15	3.9	2.7	2.7	2.75	2.85	2.8	.....
25	5.4	5.3	3.7	2.7	2.6	2.7	2.85	2.7	.....
26	5.85	5.4	3.5	2.7	2.6	2.7	2.75	2.7	.....
27	6.2	5.45	3.5	2.7	2.6	2.7	2.75	2.7	.....
28	6.6	5.85	3.5	2.8	2.6	2.7	2.65	2.7	.....
29	6.65	6.1	3.8	3.0	2.6	2.7	2.65	2.7	.....
30	6.3	6.3	3.6	3.0	2.6	2.7	2.75	2.7	.....
31	.....	6.35	.....	3.0	2.6	.....	2.75	.....	.....

Daily discharge, in second-feet, of Williams River at Hamilton, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	890	1,215	176	72	35	57	57	50
2	.....	710	1,190	166	72	35	57	64	57
3	.....	622	1,190	157	64	42	72	64	57
4	.....	675	1,140	139	64	88	57	64	.....
5	.....	770	1,022	166	64	112	57	64	.....
6	.....	658	870	157	57	72	57	50	.....
7	.....	622	870	130	57	57	57	50	.....
8	.....	692	830	104	57	50	57	50	.....
9	.....	910	730	104	57	42	57	50	.....
10	.....	1,268	675	104	50	42	57	50	.....
11	.....	1,580	588	88	57	42	57	50	.....
12	.....	1,460	588	88	42	57	57	50	.....
13	.....	1,140	588	104	57	64	57	57	.....
14	.....	932	554	72	57	64	57	57	.....
15	320	932	506	88	57	88	57	57	.....
16	272	750	474	104	50	72	57	57	.....
17	283	640	460	96	50	88	57	57	.....
18	333	605	416	104	42	72	80	57	.....
19	440	588	401	80	42	72	104	57	.....
20	570	622	387	72	42	57	96	64	.....
21	730	675	360	72	50	57	88	50	.....
22	554	570	333	72	130	72	57	80	.....
23	506	570	308	72	64	72	57	72	.....
24	605	658	283	57	57	64	80	72	.....
25	750	710	237	57	42	57	80	57	.....
26	932	750	196	57	42	57	64	57	.....
27	1,090	770	196	57	42	57	64	57	.....
28	1,295	932	196	72	42	57	50	57	.....
29	1,322	1,045	260	104	42	57	50	57	.....
30	1,140	1,140	216	104	42	57	64	57	.....
31	.....	1,165	.....	104	42	.....	64	.....	.....

Monthly discharge of Williams River at Hamilton, Colo., for 1910.

[Drainage area, 341 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
April 15–30	1,320	272	696	2.04	1.21	22,100
May	1,580	570	840	2.46	2.84	51,600
June	1,220	196	576	1.69	1.89	34,300
July	176	57	101	.296	.34	6,210
August	130	42	55.0	.161	.19	3,380
September	112	35	61.9	.182	.20	3,680
October	104	50	63.9	.187	.22	3,930
November	64	50	58.1	.170	.19	3,460
The period						129,000

LITTLE SNAKE RIVER AT DIXON, WYO.

This station, which is located at the steel highway bridge 1 mile west of Dixon, Wyo., was established May 28, 1910, by the State engineer of Colorado, by whom the records are furnished.

A chain gage is attached to the upstream handrail of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections. Discharge measurements must be corrected to eliminate errors caused by the angle at which the current passes beneath the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Little Snake River at Dixon, Wyo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 28	C. L. Chatfield	122	649	4.55	1,940
July 16	do	40	19	.50	17.4
Sept. 6	do	50	30	.80	53.0
Nov. 8	do	39	45	1.02	68.0

Daily gage height, in feet, of Little Snake River at Dixon, Wyo., for 1910.

[Nina Madsen, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.5	1.35	0.8	0.5	0.7	0.9	1.0
2	.....	4.5	1.0	.8	.5	.8	1.0	.9
3	.....	4.3	.9	.7	.5	.9	.95	.95
4	.....	4.05	.85	.5	.6	1.0	.9	1.0
5	.....	3.8	.9	.5	.95	1.0	.9	1.0
6	.....	3.65	.9	.5	.75	1.0	.85	1.0
7	.....	3.5	.85	.5	.6	1.0	1.0	1.0
8	.....	3.3	.8	.4	.5	.9	1.05	1.1
9	.....	3.1	.7	.4	.5	.85	1.0	1.0
10	.....	2.85	.7	.4	.5	.85	1.1	1.05
11	.....	2.7	.65	.4	.5	.85	1.0	.....
12	.....	2.65	.5	.4	.5	.8	1.0	.....
13	.....	2.65	.45	.4	.5	.9	1.0	.....
14	.....	2.55	.45	.4	.6	.9	1.0	.....
15	.....	2.35	.4	.4	.8	.9	1.0	.....
16	.....	2.2	.5	.4	.7	.9	1.0	.....
17	.....	2.4	.4	.4	.7	1.1	1.05	.....
18	.....	2.2	.4	.5	.9	1.35	1.0	.....
19	.....	2.05	.45	.45	.95	1.3	1.0	.....
20	.....	1.8	.5	.5	.9	1.2	1.0.	.....
21	.....	1.65	.5	.5	.8	1.0	.85	.....
22	.....	1.5	.5	.5	.85	1.0	1.1	.....
23	.....	1.25	.45	.5	.85	1.05	1.1	.....
24	.....	1.15	.4	.4	.9	1.1	1.05	.....
25	.....	1.15	.5	.35	.85	1.1	1.1	.....
26	.....	1.15	.45	.4	.8	1.15	1.1	.....
27	4.1	1.1	.4	.35	.8	1.2	.95	.....
28	4.5	1.0	.4	.35	.8	1.1	.9	.....
29	4.65	1.25	.65	.5	.8	1.0	1.1	.....
30	4.7	1.2	.95	.5	.8	1.0	1.0	.....
31	4.6	.....	.9	.5	.....	1.05	.....	.....

Daily discharge, in second-feet, of Little Snake River at Dixon, Wyo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,905	149	47	17	35	61	77
2	.....	1,905	77	47	17	47	77	61
3	.....	1,740	61	35	17	61	69	69
4	.....	1,552	54	17	25	77	61	77
5	.....	1,365	61	17	69	77	61	77
6	.....	1,255	61	17	41	77	54	77
7	.....	1,150	54	17	25	77	77	77
8	.....	1,015	47	11	17	61	86	95
9	.....	890	35	11	17	54	77	77
10	.....	748	35	11	17	54	95	86
11	.....	670	30	11	17	54	77	.....
12	.....	645	17	11	17	47	77	.....
13	.....	645	14	11	17	61	77	.....
14	.....	595	14	11	25	61	77	.....
15	.....	502	11	11	47	61	77	.....
16	.....	435	17	11	35	61	77	.....
17	.....	525	11	11	35	95	86	.....
18	.....	435	11	17	61	149	77	.....
19	.....	370	14	14	69	137	77	.....
20	.....	281	17	17	61	115	77	.....
21	.....	233	17	17	47	77	54	.....
22	.....	188	17	17	54	77	95	.....
23	.....	126	14	17	54	86	95	.....
24	.....	105	11	11	61	95	86	.....
25	.....	105	17	9	54	95	95	.....
26	.....	105	14	11	47	105	95	.....
27	1,590	95	11	9	47	115	69	.....
28	1,905	77	11	9	47	95	61	.....
29	2,032	126	30	17	47	77	95	.....
30	2,075	115	69	17	47	77	77	.....
31	1,990	.....	61	17	.....	86	.....	.....

NOTE.—Discharge Dec. 11 to 31 estimated at 77 second-feet per day.

Monthly discharge of Little Snake River at Dixon, Wyo., for 1910.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	1,900	77	663	0.514	0.57	39,500
July	149	11	34.3	.027	.03	2,110
August	47	9	16.3	.013	.02	1,000
September	69	17	38.4	.030	.03	2,280
October	149	35	78.9	.061	.07	4,850
November	95	54	77.3	.060	.07	4,600
December	.....	.....	77.1	.060	.07	4,740
The period	.....	.....	.....	.....	.....	59,100

SLATER CREEK NEAR SLATER, COLO.

This station, which is located at a private bridge 2 miles above the Slater reservoir dam site and 3 miles from Slater, was established May 28, 1910, by the State engineer of Colorado, by whom the records are furnished.

A rod gage is attached to the left abutment of the upstream side of the bridge.

High-stage measurements are made from the bridge; low-stage measurements are made by wading at various sections.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Slater Creek near Slater, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 15	C. L. Chatfield	29	25.8	1.17	9.8
Sept. 6	.....do	16	8.3	1.17	11
Nov. 7	.....do	17.8	12	1.20	13

Daily gage height, in feet, of Slater Creek near Slater, Colo., for 1910.

[H. V. Rowell, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.9	1.4	1.25	1.1	1.15	.....	1.25
2	.....	2.85	1.4	1.2	1.1	1.2	.....	1.25
3	.....	2.8	1.4	1.2	1.1	1.35	.....	1.3
4	.....	2.6	1.4	1.15	1.4	.....	.....	1.25
5	.....	2.5	1.4	1.2	1.3	.....	.....	1.2
6	.....	2.5	1.3	1.15	1.2	.....	.....	1.15
7	.....	2.4	1.3	1.1	1.15	.....	.....	1.25
8	.....	2.35	1.25	1.1	1.15	.....	.....	1.3
9	.....	2.25	1.25	1.1	1.15	.....	1.3	1.3
10	.....	2.15	1.25	1.1	1.1	.....	1.25	.....
11	.....	2.1	1.2	1.1	1.1	.....	1.25	.....
12	.....	2.1	1.2	1.05	1.1	.....	1.25	.....
13	.....	2.1	1.2	1.1	1.1	.....	1.25	.....
14	.....	2.15	1.2	1.1	1.4	.....	1.3	.....
15	.....	2.0	1.15	1.1	1.2	.....	1.3	.....
16	.....	1.95	1.2	1.1	1.15	.....	1.25	.....
17	.....	2.0	1.15	1.05	1.15	.....	1.25	.....
18	.....	1.9	1.3	1.0	1.15	.....	1.25	.....
19	.....	1.8	1.25	1.0	1.2	.....	1.25	.....
20	.....	1.7	1.2	1.0	1.2	.....	1.1	.....
21	.....	1.7	1.2	1.1	1.2	.....	1.3	.....
22	.....	1.6	1.15	1.1	1.2	.....	1.25	.....
23	.....	1.6	1.15	1.1	1.2	.....	1.25	.....
24	.....	1.5	1.15	1.1	1.2	.....	1.3	.....
25	.....	1.5	.95	1.1	1.2	.....	1.3	.....
26	.....	1.5	.9	1.05	1.15	.....	1.3	.....
27	.....	1.4	.95	1.05	1.15	.....	1.25	.....
28	2.95	1.4	.9	1.05	1.15	.....	1.25	.....
29	2.95	1.4	1.5	1.05	1.15	.....	1.3	.....
30	3.0	1.55	1.5	1.1	1.15	.....	1.3	.....
31	2.9	.....	1.2	1.1	.....	.....	.....	.....

Daily discharge, in second-feet, of Slater Creek near Slater, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	143	22	14	8	10	.....	14
2	.....	138	22	12	8	12	.....	14
3	.....	133	22	12	8	20	.....	17
4	.....	113	22	10	22	.....	.....	14
5	.....	103	22	12	17	.....	.....	12
6	.....	103	17	10	12	.....	.....	10
7	.....	94	17	8	10	.....	.....	14
8	.....	90	14	8	10	.....	.....	17
9	.....	81	14	8	10	.....	17	17
10	.....	73	14	8	8	.....	14	.....
11	.....	69	12	8	8	.....	14	.....
12	.....	69	12	6	8	.....	14	.....
13	.....	69	12	8	8	.....	14	.....
14	.....	73	12	8	22	.....	17	.....
15	.....	61	10	8	12	.....	17	.....
16	.....	57	12	8	10	.....	14	.....
17	.....	61	10	6	10	.....	14	.....
18	.....	53	17	5	10	.....	14	.....
19	.....	46	14	5	12	.....	14	.....
20	.....	39	12	5	12	.....	8	.....
21	.....	39	12	8	12	.....	17	.....
22	.....	33	10	8	12	.....	14	.....
23	.....	33	10	8	12	.....	14	.....
24	.....	27	10	8	12	.....	17	.....
25	.....	27	4	8	12	.....	17	.....
26	.....	27	3	6	10	.....	17	.....
27	.....	22	4	6	10	.....	14	.....
28	148	22	3	6	10	.....	14	.....
29	148	22	27	6	10	.....	17	.....
30	153	30	27	8	10	.....	17	.....
31	143	.....	12	8	.....	.....	.....	.....

NOTE.—Discharge Dec. 10 to 31 estimated at 14 second-feet per day.

Monthly discharge of Slater Creek near Slater, Colo., for 1910.

[Drainage area, 143 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	143	22	65.0	0.454	0.51	3,870
July	27	3	13.9	.091	.10	855
August	14	5	8.03	.056	.06	494
September	22	8	11.2	.077	.09	664
November 9–30	17	8	15.0	.105	.09	655
December	17	10	14.1	.099	.11	867
The period						7,400

DUCHESNE RIVER BASIN.

GENERAL FEATURES.

Duchesne River rises in the high peaks of the Uinta and Wasatch mountains in northeastern Utah, flows for about 100 miles in a general southeasterly direction, and enters Green River at Ouray, Utah, about 3 miles above the mouth of White River. The stream has a total drainage area of 4,000 square miles. Altitudes range from 4,700 feet at the mouth of the river to more than 13,000 feet at the summits of the highest peaks.

The principal tributaries of the Duchesne are Rock (East) Creek, Strawberry River, Lake Fork, and Uinta River.

The drainage basin of the upper Duchesne proper is mountainous. The stream emerges from the mountains at the mouth of Rock Creek, at an elevation of about 6,000 feet. From the mouth of Strawberry River down to Lake Fork the valley of the Duchesne is about 2 miles in average width and is bordered by sandstone bluffs approximately 200 feet high. Along the lower course of the stream the plateaus on each side of the stream valley are comparatively low and can be easily reached by irrigation canals from the main stream.

Strawberry River, the main upper tributary of the Duchesne, rises in the Uinta Mountains and enters the Duchesne at Theodore. It drains an area comprising about 1,200 square miles. The upper stream basin has numerous tributaries, particularly from the north and west. Among the most important may be mentioned Indian Creek, Bryant's Fork, Mud Creek, Horse Creek, Sugar Springs, and Co-op Creek. All are short and all fall rapidly until they reach Strawberry Valley, through which they flow sluggishly in well-defined channels. The main stream traverses the valley from north to south and is very sluggish. As its average elevation is 7,500 feet above sea level, Strawberry Valley is not well suited for agricultural develop-

ment, but it is excellently adapted to grazing. At the mouth of the river, about 35 miles below Strawberry Valley, the elevation is about 5,500 feet, and the fall in that distance is, therefore, nearly 2,000 feet.

Rock Creek, Lake Fork, and the Uinta and its most important tributary, the Whiterocks, head in a series of small snow-fed lakes in the Uinta Mountains and drain areas mountainous and difficult of access, and emerge from their canyons at an elevation of about 7,000 feet.

The drainage area of the Duchesne includes about 1,400 square miles of forest reserve, of which about 1,000 square miles may be classed as timbered land. The timbered land is distributed through the areas of the tributaries about as follows: Upper Duchesne, 120 square miles; Rock Creek, 130 square miles; Strawberry River, 380 square miles; Lake Fork, 190 square miles; Uinta (above Whiterocks) 120 square miles; Whiterocks, 70 square miles.

In the plains area the average rainfall is probably less than 10 inches; in the middle part comprising considerably over half the area, it probably averages between 10 and 15 inches; in only a small part in the high mountains is there an annual precipitation in excess of 20 inches, and at Fort Duchesne, at an elevation of 5,000 feet, a record extending over several years shows a mean annual rainfall of only 7 inches. The winters are very severe. In the high mountains the snowfall is heavy, and in many places the snow lies through the whole year. All the streams in this region are usually covered with thick ice from about December 1 to April 1 of each year.

At the present time the water in these streams is unused except for irrigation. Practically no storage is used in connection with any of the irrigation systems now in operation or under construction, but as the mountain drainage areas of all the main tributaries are studded with lakes, reservoir sites can easily be found where water can be stored for the irrigation of the valley lands.

The United States Reclamation Service is constructing a tunnel, with a capacity of 500 second-feet, which will divert water from a 100,000-acre reservoir on the upper Strawberry across the divide to the headwaters of the Spanish Fork, there to be used for irrigation.

Very little water will be diverted for irrigation above an elevation of 6,500 feet, and as most of the reservoir sites are at an elevation of 8,000 feet or more, and some of the streams fall 100 to 150 feet or more to the mile in their upper stretches, good opportunities for power development exist above irrigation ditches.

DUCHESNE RIVER AT MYTON, UTAH.[1]

This station, which was located at the highway bridge at Myton, Utah, about 3 miles below the mouth of Lake Fork and about 15

[1] Described in the earlier reports as the Price Road Bridge station.

miles above the mouth of Uinta River, was established October 26, 1899. The records show practically the entire run-off of the Duchesne basin above the mouth of Uinta River.

The datum of the gage remained practically constant from the establishment of the station until June 6, 1909, when the river cut a new channel around the bridge and the bridge station was abandoned. A new chain gage was established July 9, 1909, about one-fourth of a mile upstream from the bridge and at a different datum. This gage was replaced on August 9, 1909, by another chain gage 100 feet downstream on right bank, at the same datum.

A chain gage was installed August 6, 1910, on the new single-span steel bridge across the river. This bridge is located near the northwest boundary of the Myton town site, about one-fourth of a mile upstream from the old gage and half a mile upstream from the original location at the wooden bridge.

There was no bridge or cable from which discharge measurements could be made during the latter part of 1909 and first part of 1910.

Discharge measurements are also made from the new bridge.

Ditches built by the United States Indian Office divert water from this stream and its tributaries for irrigation on the Uinta Reservation. Water is also diverted by private enterprise for irrigation outside the limits of the reservation.

Observations at this station are affected by ice for about four months each year, and during this period it is usually impossible to apply open-channel ratings.

Discharge measurements of Duchesne River at Myton, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 20	R. H. Fletcher	90	195	7.45	304
Feb. 12	do	80	172	7.80	355
24	do	95	271	7.80	636
June 22	do	128	360	5.60	1,140
July 13	do	96	206	4.90	467
27	do	96	187	4.70	390
Aug. 6	do	96	201	4.88	468
23	do	95	182	4.57	352
Sept. 8	do	95	163	4.50	293
26	do	96	204	5.00	494
Oct. 11	do	95	194	4.80	420
22	do	98	235	5.20	607
Nov. 6	do	95	198	4.90	453
19	do	95	198	4.88	441

NOTE.—Gage established at new location and datum Aug. 6, 1910; the reading that day was 2.10 feet. For measurements from Aug. 6 to Oct. 22, both gages were read and the new gage was found to read about 2.7 feet lower than the old gage, which was established Aug. 9, 1909. For the measurements made Nov. 6 and Nov. 19, the new gage only was read, so the readings were made to conform to the old gage by adding 2.7 feet.

Daily gage height, in feet, of Duchesne River at Myton, Utah, for 1910.

[George Elliott, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	5.5	7.6	8.0	5.6	5.2	4.45	4.9	4.95
2	.....	5.55	7.4	7.85	5.5	5.1	4.45	4.9	4.95
3	.....	5.6	7.1	7.7	5.45	5.1	4.45	4.85	4.95
4	.....	5.6	6.9	7.35	5.4	5.0	4.5	4.9	4.95
5	.....	5.6	6.9	7.15	5.4	4.9	4.55	4.9	4.95
6	.....	5.6	6.9	7.0	5.4	4.85	4.55	4.85	4.9
7	.....	5.6	6.8	6.8	5.3	4.7	4.5	4.85	4.9
8	.....	5.65	6.9	6.6	5.2	4.7	4.5	4.8	4.9
9	.....	5.7	7.15	6.45	5.1	4.65	4.4	4.8	4.9
10	.....	5.75	7.7	6.3	5.0	4.6	4.4	4.8	4.9
11	.....	5.9	8.2	6.3	4.9	4.55	4.4	4.8	4.9
12	6.5	6.1	8.3	6.2	4.9	4.65	4.4	4.8	4.9
13	6.1	6.2	8.2	6.2	4.9	4.75	4.5	4.9	4.9
14	5.7	6.3	7.95	6.1	4.8	4.75	4.5	4.9	4.9
15	5.4	6.3	7.8	6.0	4.9	4.75	4.65	4.95	4.9
16	5.4	6.25	7.6	5.95	5.0	4.7	4.85	5.5	4.9
17	5.4	6.2	7.25	5.9	5.1	4.6	5.35	5.4	4.9
18	5.4	6.3	7.1	5.9	5.1	4.5	5.35	5.3	4.9
19	5.45	6.4	7.0	5.8	5.0	4.5	5.5	5.3	4.9
20	5.5	6.5	7.05	5.8	5.0	4.8	5.4	5.3	4.9
21	5.5	6.65	7.0	5.7	4.9	4.6	5.65	5.2	4.9
22	5.6	6.7	6.9	5.6	4.9	4.55	5.55	5.2	4.9
23	5.7	6.75	6.8	5.55	4.8	4.55	5.1	5.1	4.9
24	5.7	6.8	7.1	5.5	4.8	4.5	5.0	5.15	4.9
25	5.65	6.95	7.45	5.5	4.7	4.4	5.0	5.05	4.9
26	5.7	7.15	7.3	5.4	4.75	4.4	5.0	5.05	4.9
27	5.65	7.4	7.15	5.4	4.7	4.4	5.0	5.05	4.9
28	5.6	7.55	7.4	5.4	4.85	4.4	4.95	5.0	4.9
29	5.6	7.85	7.65	5.6	4.95	4.45	4.95	5.0	4.9
30	5.55	7.8	8.0	5.8	4.9	4.45	4.9	5.0	4.9
31	5.5	.....	8.0	.....	4.9	4.45	.....	5.0	.....

NOTE.—Observations on the old gage established Aug. 9, 1909, were discontinued Oct. 22, 1910; new gage read from Oct. 23 to Nov. 30. These readings were reduced to the datum of the old gage by adding 2.7 feet—the difference between the two gages.

Daily discharge, in second-feet, of Duchesne River at Myton, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	980	4,060	4,840	1,090	685	300	475	470
2	.....	1,040	3,700	4,540	980	605	300	475	470
3	.....	1,090	3,190	4,260	928	605	300	450	480
4	.....	1,090	2,860	3,610	875	535	315	475	480
5	.....	1,090	2,860	3,270	875	475	332	475	480
6	.....	1,090	2,860	3,020	875	450	332	450	455
7	.....	1,090	2,700	2,700	775	385	315	450	455
8	.....	1,150	2,860	2,400	685	385	315	425	455
9	.....	1,200	3,270	2,170	605	368	285	425	455
10	.....	1,260	4,260	1,960	535	350	285	425	455
11	.....	1,440	5,240	1,960	475	332	285	425	455
12	2,240	1,700	5,440	1,820	475	368	285	425	455
13	1,700	1,820	5,240	1,820	475	405	315	462	455
14	1,200	1,960	4,740	1,700	425	405	315	462	455
15	875	1,960	4,440	1,570	475	405	368	480	455
16	875	1,890	4,060	1,510	535	385	450	935	455
17	875	1,820	3,440	1,440	605	350	825	820	455
18	875	1,960	3,190	1,440	605	315	825	722	455
19	928	2,100	3,020	1,320	535	315	980	705	455
20	980	2,240	3,110	1,320	535	425	875	705	455
21	980	2,470	3,020	1,200	475	350	1,150	605	455
22	1,090	2,550	2,860	1,090	475	332	1,040	605	455
23	1,200	2,630	2,700	1,040	425	332	605	540	455
24	1,200	2,700	3,190	980	425	315	535	575	455
25	1,150	2,940	3,790	980	385	285	535	510	455
26	1,200	3,270	3,520	875	405	285	535	520	455
27	1,150	3,700	3,270	875	385	285	535	520	455
28	1,090	3,970	3,700	875	450	285	505	490	455
29	1,090	4,540	4,160	1,090	505	300	505	490	455
30	1,040	4,440	4,840	1,320	475	300	475	500	455
31	980	.....	4,840	.....	475	300	.....	500	.....

NOTE.—Daily discharge Mar. 12 to Oct. 11 determined from a rating curve fairly well defined between 300 and 1,200 second-feet. Daily discharge Oct. 12 to Nov. 30, determined by indirect method for shifting channels.

Monthly discharge of Duchesne River at Myton, Utah, for 1910.

[Drainage area, 2,750 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
Mar. 12-31	2,240	875	1,140	0.415	0.31	45,200	C.
April	4,540	980	2,110	.767	.86	126,000	D.
May	5,440	2,700	3,690	1.34	1.54	227,000	D.
June	4,840	875	1,970	.716	.80	117,000	D.
July	1,090	385	588	.214	.25	36,200	B.
August	685	285	384	.140	.16	23,600	A.
September	1,150	285	501	.182	.20	29,800	B.
October	935	425	533	.194	.22	32,800	B.
November	480	455	458	.167	.19	27,300	B.
December							
The period						665,000	

STRAWBERRY RIVER ABOVE MOUTH OF INDIAN CREEK, IN STRAWBERRY VALLEY, UTAH.

A station was established on Strawberry River September 15, 1909, in the narrows about 3 miles above the mouth of Indian Creek and about one-quarter mile below the dam site of the Strawberry Valley project, to determine the amount of water available for storage from Strawberry River for the Strawberry Valley project of the United States Reclamation Service. The station takes the place of the one previously maintained below Indian Creek. The new station is about 35 miles northeast of Thistle, Utah, the nearest railroad point. The drainage area above this station is 132 square miles.

The vertical staff gage is on the right bank directly underneath the cable from which discharge measurements are made.

Neither bank is likely to be overflowed except at extreme high water. The stream bed consists of coarse gravel and although rough is believed to be fairly permanent. The conditions for measuring during the open-water season are good.

The river is frozen and deeply covered with snow about five months of the year. The flow during the winter is, however, fairly constant and a fair estimate of it may be made.

This station was discontinued November 15, 1910.

Discharge measurements of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	47	105	3.91	237
July 23	do	43	44	2.51	27
Aug. 23	do	45	44	2.45	[a] 20
25	do	32	27	2.42	[a] 17

[a] Wading above cable.

Daily gage height, in feet, of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			3.3					
2					2.5			2.5
3						2.4		
4			3.1					
5		4.45						
6					2.5	2.45	2.55	
7		4.45	2.95					
8				2.6				
9					2.5	2.45		2.5
10								
11		5.0	2.9					
12				2.55	2.5			
13	5.15					2.4	2.55	
14		4.6						2.5
15			2.8					
16		4.25		2.55				
17				2.6		2.7		
18		4.0	2.75					
19					2.45		2.6	
20		3.9				2.55		
21								
22		3.7	2.7		2.5			
23				2.5				
24	5.55					2.5		
25			2.7					
26				2.5	2.4		2.55	
27		3.5	2.7					
28								
29			2.7			2.5		
30				2.5	2.4			
31								

Daily discharge, in second-feet, of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		455	120	39	24	18	26	24
2		430	109	38	24	18	26	24
3		405	98	37	24	18	27	24
4		380	88	36	24	19	27	24
5		355	81	35	24	20	28	24
6		353	74	34	24	21	28	24
7		355	68	33	24	21	28	24
8		385	68	32	24	21	28	24
9		415	66	31	24	21	28	24
10		445	64	30	24	20	28	24
11		476	62	29	24	19	28	24
12		446	59	28	24	18	28	24
13	509	417	56	28	24	18	28	24
14		388	53	28	23	24	28	24
15		350	50	28	23	30	29	24
16		311	49	28	22	35	29	
17		282	47	32	22	40	30	
18		256	45	32	21	36	31	
19		246	44	30	21	32	32	
20		236	43	28	22	28	31	
21		216	42	26	23	28	30	
22		196	40	24	24	28	30	
23		188	40	24	22	28	29	
24	597	180	40	24	21	28	29	
25		172	40	24	20	28	28	
26		164	40	24	18	27	28	
27		156	40	24	18	26	27	
28		150	40	24	18	25	26	
29		143	40	24	18	24	26	
30		135	40	24	18	24	25	
31		128		24	18		25	

NOTE.—Daily discharge determined from a rating curve well defined below 75 second-feet and fairly well defined between 75 and 300 second-feet. Discharge interpolated for days of missing gage heights as the stage is very uniform.

Monthly discharge of Strawberry River above mouth of Indian Creek, in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	476	128	297	18,300	B.
June	120	40	58.2	3,460	B.
July	[a] 39	24	29.1	1,790	B.
August	24	18	22.1	1,360	A.
September	40	18	24.8	1,480	A.
October	32	25	28.1	1,730	A.
November 1-15			24.0	714	A.
The period				28,800	

[a] Interpolated.

STRAWBERRY RIVER AT THEODORE, UTAH.

This station, which is located at the west boundary of the Theodore town site, along the wagon road to Heber, about 1¼ miles above the junction of the Strawberry with Duchesne River, about half a mile upstream from the mouth of Indian Canyon, and about 18 miles below the mouth of Currant Creek, was established June 10, 1908, and discontinued November 30, 1910. The drainage area above the station is 1,060 square miles.

The cham gage was located about 50 feet downstream from cable from which discharge measurements were made. The datum of the gage remained constant during the maintenance of the station.

The results obtained from observations at this station were good except at extremely high stages, when the stream overflows the left bank, rendering it impossible to make measurements.

Discharge measurements of Strawberry River at Theodore, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	W. B. Freeman	61	105	3.44	286
30	R. H. Fletcher	62	133	3.53	363
Apr. 12	....do	66	220	4.93	938
26	....do	75	359	6.89	1,630
May 10	....do	70	282	6.05	1,240
June 21	....do	62	112	3.54	300
July 12	....do	61	91	3.20	211
26	....do	61	83	3.10	172
Aug. 8	....do	61	80	3.02	159
22	....do	61	78	3.02	160
Sept. 9	....do	60	70	2.90	127
25	....do	60	73	2.98	150
Oct. 10	....do	60	75	2.98	150
21	....do	60	75	3.08	160
Nov. 5	....do	60	73	2.96	138
18	....do	60	71	2.92	136

Daily gage height, in feet, of Strawberry River at Theodore, Utah, for 1910.

[M. M. Smith, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	3.45	6.55	4.4	3.55	3.3	2.9	2.95	2.95
2	.....	3.5	6.35	4.35	3.4	3.2	2.9	3.0	2.95
3	.....	3.65	6.1	4.3	3.4	3.1	2.9	3.0	2.95
4	.....	3.7	5.9	4.2	3.4	3.05	2.9	3.0	2 95
5	.....	3.7	5.9	4.15	3.4	3.1	2.95	3.0	2 95
6	.....	3.75	5.9	4.1	3.4	3.05	2.9	3.0	2.95
7	.....	3.75	5.75	4.0	3.3	3.05	2.9	3.0	2.95
8	.....	3.8	5.8	4.0	3.3	3.0	2.9	2.95	2.95
9	.....	3.9	5.9	3.9	3.25	3.0	2.9	2.95	2.9
10	3.45	3.2	6.0	3.9	3.2	2.95	2.9	2.95	2.9
11	3.3	3.5	6.25	3.85	3.2	2.95	2.85	2.95	2.95
12	3.3	4.95	6.35	3.8	3.2	3.0	2.85	2.95	2.95
13	3.2	5.2	6.25	3.8	3.2	3.15	2.9	3.0	2.95
14	3.15	5.55	6.1	3.7	3.2	3.0	2.9	3.05	2.9
15	3.2	5.55	5.9	3.7	3.2	3.0	2.9	3.15	2.9
16	3.2	5.35	5.85	3.7	3.25	2.95	3.25	3.2	2.9
17	3.2	5.55	5.6	3.7	3.3	2.95	3.4	3.2	2.9
18	3.25	5.85	5.4	3.65	3.25	2.9	3.8	3.1	2.9
19	3.25	6.3	5.3	3.6	3.25	3.35	3.3	3.2	2.9
20	3.3	6.65	5.15	3.55	3.2	3.35	3.1	3.1	2.9
21	3.4	6.9	5.1	3.55	3.2	3.0	3.1	3.05	2.9
22	3.5	7.0	5.0	3.5	3.2	3.0	3.05	3.0	2.9
23	3.7	6.75	4.9	3.5	3.15	2.95	3.0	3.0	2.9
24	3.75	6.7	4.85	3.4	3.1	2.9	3.0	3.0	2.95
25	3.7	6.8	4.8	3.4	3.1	2.9	3.0	3.0	2.95
26	3.75	6.85	4.75	3.4	3.05	2.9	3.0	3.0	2.95
27	3.7	6.95	4.7	3.4	3.15	2.9	2.95	3.0	2.95
28	3.65	6.95	4.65	3.4	3.1	2.9	2.95	3.0	2.95
29	3.6	6.85	4.55	3.5	3.1	2.9	2.95	2.95	2.95
30	3.45	6.75	4.5	4.05	3.1	2.9	2.95	2.95	2.9
31	3.4	.....	4.45	.....	3.15	2.9	.....	2.95	.....

Daily discharge, in second-feet, of Strawberry River at Theodore, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	329	1,480	585	305	235	135	148	148
2	.....	352	1,380	568	260	210	135	160	148
3	.....	398	1,260	550	260	185	135	160	148
4	.....	414	1,180	515	260	172	135	160	148
5	.....	414	1,180	498	260	185	148	160	148
6	.....	431	1,180	480	260	172	135	160	148
7	.....	431	1,110	445	235	172	135	160	148
8	.....	448	1,130	445	235	160	135	148	148
9	.....	484	1,180	410	222	160	135	148	135
10	329	265	1,220	410	210	148	135	148	135
11	290	352	1,330	395	210	148	122	148	148
12	290	941	1,380	380	210	160	122	148	148
13	265	1,060	1,330	380	210	198	135	160	148
14	263	1,240	1,260	350	210	160	135	172	135
15	265	1,240	1,180	350	210	160	135	198	135
16	265	1,140	1,150	350	222	148	222	210	135
17	265	1,240	1,040	350	235	148	260	210	135
18	278	1,390	960	335	222	135	380	185	135
19	278	1,620	920	320	222	248	235	210	135
20	290	1,750	860	305	210	248	185	185	135
21	316	1,850	840	305	210	160	185	172	135
22	352	1,860	800	290	210	160	172	160	135
23	414	1,700	760	290	198	148	160	160	135
24	431	1,620	742	260	185	135	160	160	148
25	414	1,640	725	260	185	135	160	160	148
26	431	1,620	708	260	172	135	160	160	148
27	414	1,680	690	260	198	135	148	160	148
28	398	1,680	672	260	185	135	148	160	148
29	382	1,620	638	290	185	135	148	148	148
30	329	1,580	620	462	185	135	148	148	135
31	316	.....	702	.....	198	135	.....	148	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: Mar. 10 to Apr. 19, fairly well defined; Apr. 20 to 26, indirect method for shifting channels; Apr. 27 to Nov. 30, well defined below 400 second-feet and fairly well defined above.

Monthly discharge of Strawberry River at Theodore, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 10–31	431	263	331	14,400	B.
April	1,860	265	1,090	64,900	D.
May	1,480	620	1,020	62,700	C.
June	585	260	379	22,600	C.
July	305	172	219	13,500	B.
August	248	135	165	10,100	A.
September	380	122	163	9,700	A.
October	210	148	165	10,100	A.
November	148	135	142	8,450	A.
The period				216,000	

INDIAN CREEK IN STRAWBERRY VALLEY, UTAH.

This station, which is located about 1 mile above the mouth of the creek and 500 feet below Trail Hollow Creek, the principal tributary, was established April 5, 1905, discontinued July 12, 1906, reestablished October 1, 1909, and again discontinued November15, 1910. The station was originally located about 250 feet above the mouth of the creek, but was reestablished in 1909 about half a mile farther upstream, in T. 4 S., R. 11 W. It is about 25 miles northeast of Thistle, Utah.

This point is below all tributaries, Trail Hollow Creek entering a few hundred feet above the new station. No water is diverted above the station. The drainage area above this station is 50 square miles. The records are of value to the United States Reclamation Service in connection with the Strawberry Valley project, which will divert the waters of Indian Creek across a low pass into the Strawberry Valley reservoir. The point of diversion is above this station and below Trail Hollow Creek.

The staff gage is driven vertically into the bed of the creek and braced to the right bank about 10 feet above a new footbridge from which measurements are made.

The river is frozen over and covered with a deep layer of snow during about five months of the year. The winter flow, however, is fairly constant and a fair estimate may be made. The open-water measuring conditions are excellent.

Discharge measurements of Indian Creek in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	23.5	37	2.88	98
July 24	....do	22	16	1.45	25
Aug. 23	....do	18	16	1.37	19

Daily gage height, in feet, of Indian Creek in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			2.0					
2					1.45			1.3
3						1.35		
4			1.95					
5		3.0						
6					1.45	1.35	1.35	
7		2.8	1.90					
8				1.6				
9					1.4	1.35		1.3
10								
11		2.85	1.85					
12				1.55	1.4			
13	2.1					1.35	1.35	
14		2.6						1.3
15			1.8					
16		2.65		1.55				
17						1.4		
18		2.45	1.7	1.5				
19					1.45		1.35	
20		2.9				1.4		
21								
22		2.8	1.7		1.4			
23				1.5				
24	3.05					1.4		
25			1.7					
26				1.5	1.35		1.35	
27		2.15	1.7					
28								
29			1.7			1.4		
30				1.5	1.35			
31								

Daily discharge, in second-feet, of Indian Creek in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		110	51	35	26	21	22	19
2		110	50	35	25	21	22	19
3		110	49	34	25	21	22	19
4		110	49	34	25	21	21	19
5		107	48	33	25	21	21	19
6		101	47	33	25	21	21	19
7		95	46	32	25	21	21	19
8		95	46	31	24	21	21	19
9		96	45	31	23	21	21	19
10		97	45	30	23	21	21	19
11		98	44	30	23	21	21	19
12		93	44	29	23	21	21	19
13	56	88	43	29	23	21	21	19
14		83	42	29	23	22	21	19
15		84	41	29	23	22	21	19
16		86	40	29	24	22	21	
17		80	38	28	24	23	21	
18		74	36	27	25	23	21	
19		86	36	27	25	23	21	
20		101	36	27	24	23	21	
21		98	36	27	24	23	21	
22		95	36	27	23	23	21	
23		88	36	27	23	23	21	
24	110	81	36	27	22	23	21	
25		74	36	27	22	23	21	
26		67	36	27	21	23	21	
27		59	36	27	21	23	20	
28		58	36	27	21	23	20	
29		56	36	27	21	23	20	
30		54	36	27	21	23	19	
31		52		27	21		19	

NOTE.—Daily discharge determined from a curve fairly well defined. Discharge interpolated for days on which gage heights are missing.

Monthly discharge of Indian Creek in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	[a] 110	[a] 52	86.7	5,330	B.
June	51	36	41.2	2,450	B.
July	[a] 35	27	29.3	1,800	B.
August	[a] 26	21	23.3	1,430	C.
September	23	21	22.0	1,310	C.
October	22	19	20.9	1,280	C.
November 1–15			19.0	565	C.
The period				14,200	

[a] Interpolated.

TRAIL HOLLOW CREEK IN STRAWBERRY VALLEY, UTAH.

This station, which is located just above the mouth of the stream, was established October 1, 1909, and discontinued November 15, 1910. No water is at present diverted above the station. The records indicate the portion of the flow of Indian Creek that can not be diverted into Strawberry Valley in connection with the Strawberry Valley project. The drainage area above this point is 21 square miles.

The staff gage was driven vertically into the bed of the stream and braced to the left bank.

High-stage measurements were made from a log bridge 15 feet above the gage; at low and ordinary stages measurements were made by wading.

The stream is frozen over and deeply covered with snow during about five months of the year.

Discharge measurements of Trail Hollow Creek in Strawberry Valley, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	A. B. Purton	4	6	4.25	14.2
July 23	....do	3	4	2.92	2.1
Aug. 24	....do	4	2	2.81	1.6

Daily gage height, in feet, of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

[J. C. Warfield, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1			3.75					
2					2.95			2.7
3						2.85		
4			3.6					
5		4.8						
6					2.95	2.85	2.8	
7		4.6	3.55					
8				3.1				
9						2.85		2.7
10					2.9			
11		4.9	3.4					
12				3.1	2.9			
13						2.8	2.8	
14		4.8						2.7
15			3.3					
16		4.7		3.1				
17						2.9		
18			3.25	3.0				
19					2.85		2.8	
20		3.9				2.9		
21								
22		3.4	3.2		2.85			
23				3.0				
24						2.85		
25	4.85		3.15					
26				2.95	2.8		2.8	
27		2.9	3.15					
28								
29			3.15			2.8		
30				2.95	2.8			
31								

Daily discharge, in second-feet, of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1		22	8.1	3.3	2.2	1.7	1.6	1.3
2		22	7	3.2	2.2	1.8	1.6	1.2
3		22	7	3.2	2.2	1.8	1.6	1.2
4		22	6.6	3.2	2.2	1.8	1.6	1.2
5		21.9	6.4	3.1	2.2	1.8	1.6	1.2
6		20.5	6.2	3.1	2.2	1.8	1.6	1.2
7		19.0	6.2	3.1	2.2	1.8	1.6	1.2
8		20	6	3.0	2.1	1.8	1.6	1.2
9		21	5	3.0	2.1	1.8	1.6	1.2
10		22	5	3.0	2.0	1.8	1.6	1.2
11		23.4	4.9	3.0	2.0	1.7	1.6	1.2
12		23	4.6	3.0	2.0	1.7	1.6	1.2
13		22	4.4	3.0	2.0	1.6	1.6	1.2
14		21.9	4.2	3.0	1.9	1.7	1.6	1.2
15		21	4.2	3.0	1.9	1.8	1.6	1.2
16		20.4	4.1	3.0	1.9	1.9	1.6	
17		18	4.0	2.8	1.8	2.0	1.6	
18		15	3.9	2.5	1.8	2.0	1.6	
19		12	3.8	2.5	1.8	2.0	1.6	
20		9.8	3.7	2.5	1.8	2.0	1.6	
21		7.5	3.6	2.5	1.8	2.0	1.6	
22		4.9	3.6	2.5	1.8	1.9	1.6	
23		5	3.5	2.5	1.8	1.9	1.6	
24		4	3.4	2.4	1.7	1.8	1.6	
25	22.8	3	3.3	2.3	1.7	1.8	1.6	
26		2	3.3	2.2	1.6	1.7	1.6	
27		2.0	3.3	2.2	1.6	1.7	1.5	
28		2	3.3	2.2	1.6	1.6	1.5	
29		4	3.3	2.2	1.6	1.6	1.4	
30		6	3.3	2.2	1.6	1.6	1.4	
31		8		2.2	1.7		1.3	

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days of missing gage heights.

Monthly discharge of Trail Hollow Creek in Strawberry Valley, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	23.4	2.0	14.4	885	C.
June	8.1	3.3	4.64	276	B.
July	3.3	2.2	2.74	168	B.
August	2.2	1.6	1.90	117	B.
September	2.0	1.6	1.80	107	B.
October	1.6	1.3	1.57	96	B.
November 1–15	1.3	1.2	1.21	36	B.
The period				1,690	

LAKE FORK BELOW FORKS, NEAR WHITEROCKS, UTAH.

This station, which is located about 500 feet downstream from the junction of the East and West forks, on the old Indian trail from Spanish Fork to Whiterocks, Utah, about 30 miles west of Whiterocks, was established on May 10, 1907, but a fragmentary record was maintained at the same place during 1904.

No important tributaries enter between this station and the mouth of the stream, and none on either branch for some distance above. The station is above all present diversions.

The flow of this stream could doubtless be equalized at comparatively small expense by utilizing the storage facilities afforded by a number of small lakes and reservoir sites found on both branches of the stream above the station. As both of the main tributaries have rapid fall, opportunities for power development are presented above all irrigation diversions. The drainage area above the station is 331 square miles.

The stream is icebound for several months each year.

The chain gage established May 10, 1907, has no relation whatever to the 1904 gage. Still another chain gage and datum have been used since September 1, 1907. This gage is located about 100 feet upstream from the cable from which discharge measurements are made.

As the stream bed is rough and the current is swift at high and moderate stages, the results obtained at this station can be considered only fair or approximate except at low stages, when they are fairly good.

Discharge measurements of Lake Fork below forks, near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 10	Freeman and Fletcher	36	50	1.22	[a] 126
29	R. H. Fletcher	48	72	1.60	218
Apr. 11	do	56	74	1.70	238
25	do	67	121	2.67	630
May 9	do	80	168	3.13	1,044
23	do	74	143	3.04	809
June 6	do	80	150	3.20	888
20	do	63	99	2.40	436
July 11	do	56	80	1.82	270
25	do	56	73	1.74	220
Aug. 8	do	57	75	1.73	223
22	do	57	79	1.65	243
Sept. 10	do	53	62	1.38	160
24	do	62	80	1.95	288
Oct. 8	do	55	72	1.70	233
20	do	57	78	1.78	238
Nov. 4	do	56	73	1.64	204
17	do	54	59	1.50	161

[a] Some ice present.

Daily gage height, in feet, of Lake Fork below forks, near Whiterocks, Utah, for 1910.

[Charles Elliott and Paul J. Elliott, observers.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1.5	3.0	3.85	2.15	1.95	1.45	1.75	1.6
2	.....	1.55	2.8	3.6	2.05	2.05	1.45	1.8	1.6
3	.....	1.55	2.6	3.65	2.0	1.95	1.45	1.8	1.6
4	.....	1.55	2.6	3.35	2.05	1.95	1.45	1.8	1.6
5	.....	1.5	2.55	3.25	2.15	1.85	1.45	1.75	1.6
6	1.3	1.55	2.5	3.2	2.0	1.8	1.45	1.75	1.55
7	1.4	1.6	2.55	3.05	1.95	1.75	1.4	1.7	1.55
8	1.4	1.6	2.8	2.95	1.9	1.75	1.4	1.7	1.55
9	1.4	1.65	3.15	2.8	1.8	1.65	1.4	1.6	1.55
10	1.3	1.7	3.65	2.7	1.8	1.6	1.35	1.6	1.55
11	1.3	1.7	3.95	2.8	1.8	1.65	1.4	1.6	1.55
12	1.4	1.8	4.0	2.8	1.8	1.8	1.4	1.65	1.55
13	1.4	1.8	3.9	2.75	1.75	1.75	1.5	1.75	1.55
14	1.45	1.8	3.6	2.7	1.7	1.9	1.5	1.75	1.55
15	1.5	1.7	3.5	2.6	1.9	1.8	1.5	1.9	1.55
16	1.5	1.7	3.3	2.6	2.1	1.7	1.9	2.05	1.5
17	1.5	1.7	3.1	2.6	2.1	1.7	2.15	1.9	1.5
18	1.5	1.75	3.1	2.5	1.95	1.7	2.15	1.9	1.5
19	1.6	1.9	3.25	2.4	2.0	1.6	2.35	1.9	1.5
20	1.6	2.05	3.2	2.4	1.9	1.6	2.3	1.8	1.5
21	1.7	2.15	3.05	2.3	2.0	1.6	2.2	1.8	1.45
22	1.7	2.2	2.9	2.3	1.9	1.55	2.05	1.8	1.45
23	1.75	2.25	3.05	2.2	1.8	1.55	2.0	1.75	1.45
24	1.75	2.4	3.4	2.15	1.8	1.5	1.95	1.75	1.45
25	1.7	2.6	3.5	2.15	1.75	1.5	1.95	1.75	1.4
26	1.7	2.8	3.3	2.1	1.65	1.5	1.95	1.7	1.4
27	1.65	2.95	3.3	2.05	1.75	1.5	1.8	1.7	1.4
28	1.6	3.1	3.5	2.1	1.8	1.55	1.8	1.7	1.4
29	1.6	3.15	3.7	2.3	2.0	1.5	1.7	1.65	.....
30	1.5	3.05	3.7	2.2	1.95	1.45	1.7	1.65	.....
31	1.5	.....	3.8	.....	1.9	1.45	.....	1.65	.....

Daily discharge, in second-feet, of Lake Fork below forks, near Whiterocks, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	125	196	880	1,580	350	285	160	229	192
2	125	206	740	1,280	316	316	160	242	192
3	125	206	610	1,340	300	285	160	242	192
4	125	206	610	1,050	316	285	160	242	192
5	125	196	580	970	350	256	160	229	192
6	125	206	550	930	300	242	160	229	181
7	125	215	580	820	285	229	150	216	181
8	125	215	740	750	270	229	150	216	181
9	125	226	995	650	242	204	150	192	181
10	125	236	1,450	590	242	192	141	192	181
11	130	236	1,760	650	242	204	150	192	181
12	150	260	1,770	650	242	242	150	204	181
13	150	260	1,640	620	229	229	170	229	181
14	187	260	1,280	590	216	270	170	229	181
15	196	236	1,180	535	270	242	170	270	181
16	196	236	1,010	535	332	216	270	316	170
17	196	236	855	535	332	216	350	270	170
18	196	248	855	485	285	216	350	270	170
19	215	287	970	440	300	192	421	270	170
20	215	334	930	440	270	192	402	242	170
21	236	374	820	402	300	192	366	242	160
22	236	395	715	402	270	181	316	242	160
23	248	420	820	366	242	181	300	229	160
24	248	495	1,100	350	242	170	285	229	160
25	236	610	1,180	350	229	170	285	229	150
26	236	740	1,010	332	204	170	285	216	150
27	226	845	1,010	316	229	170	242	216	150
28	215	955	1,180	332	242	181	242	216	150
29	215	995	1,400	402	300	170	216	204	150
30	196	918	1,400	366	285	160	216	204	150
31	196	.....	1,520	.....	270	160	.....	204	.....

NOTE.—Daily discharge Mar. 1–13 estimated because of presence of ice. Gage heights missing and discharge estimated Nov. 29 to 30.

Discharge Mar. 14 to May 11 determined from a rating curve fairly well defined below 1,200 second-feet. Discharge May 12 to Nov. 30 determined from a curve well defined throughout.

Monthly discharge of Lake Fork below forks, near Whiterocks, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	248	160	180	11,100	C.
April	995	196	382	22,700	B.
May	1,770	550	1,040	64,000	C.
June	1,580	316	635	37,800	B.
July	350	204	274	16,800	B.
August	316	160	214	13,200	B.
September	421	141	230	13,700	B.
October	316	192	231	14,200	B.
November	192	150	172	10,200	B.
The period	.....	.....	.....	204,000	

LAKE FORK NEAR MYTON, UTAH.[1]

This station, which is located about 3 miles above Myton, Utah, about half a mile above the junction of the stream with Duchesne River, was established July 3, 1900, discontinued at the end of the

[1] Described in early reports as "Lake Fork at mouth."

season of 1903, reestablished in June, 1907, and again discontinued November 30, 1910.

In connection with the records obtained at the station on Lake Fork below the forks, which is about 20 miles upstream and above all present diversions, the records indicate the amount of water diverted for irrigation along the stream. No important tributaries enter between the two stations.

Several canal systems built by the United States Indian Office take water from this stream above the station for irrigation. Some private canal systems are proposed or in operation. The stream is icebound for several months during the winter season.

The gage was in the same position and the same datum was used from 1900 to 1904, inclusive. During 1907 and 1908 three distinct gages and datums were used—from June 13 to 30, 1907, from August 18 to December 31, 1907, and during 1908. Very satisfactory results were obtained during 1908 and 1909, but previous records are not so good. On June 22, 1909, the gage was removed to the opposite bank and reinstalled at a different datum. Gage heights, beginning June 22, 1909, are therefore not comparable with those of previous dates.

Discharge measurements of Lake Fork near Myton, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	R. H. Fletcher	65	87	3.80	[a] 127
Feb. 11	do	60	99	4.00	[a] 147
23	do	60	101	4.00	[a] 149
Mar. 11	W. B. Freeman	54	135	2.88	[b] 142
30	R. H. Fletcher	65	121	2.26	141
Apr. 12	do	66	131	2.45	185
26	do	66	206	3.52	519
May 10	do	69	276	4.51	1,000
24	do	68	242	4.08	790
June 7	do	67	221	3.82	616
21	do	66	141	2.58	212
July 12	do	57	83	1.66	47
26	do	56	75	1.50	30
Aug. 6	do	59	87	1.76	61
23	do	58	87	1.70	53
Sept. 8	do	33	21	1.32	14
26	do	63	111	2.10	111
Oct. 10	do	60	93	1.88	73
21	do	65	126	2.48	172
Nov. 5	do	61	106	2.14	112
18	do	59	98	2.00	110

[a] Measurement taken through holes cut in ice; gage height distorted.
[b] Channel open, ice along edges. Slight ice gorge below.

Daily gage height, in feet, of Lake Fork near Myton, Utah, for 1910.

[Mrs. A. F. Pitts, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	2.2	3.8	4.9	2.5	2.25	1.25	1.8	2.15
2	.....	2.2	3.5	4.8	2.4	2.05	1.3	2.0	2.15
3	.....	2.2	3.25	4.6	2.3	2.2	1.3	1.95	2.1
4	.....	2.2	3.15	4.2	2.3	2.05	1.4	1.95	2.1
5	.....	2.3	3.05	4.0	2.35	1.9	1.35	1.9	2.1
6	.....	2.3	3.05	3.9	2.2	1.7	1.3	1.9	2.05
7	.....	2.3	3.0	3.8	2.1	1.6	1.3	1.9	2.1
8	.....	2.3	3.2	3.5	2.0	1.6	1.3	1.95	2.1
9	.....	2.3	3.65	3.3	1.9	1.5	1.25	1.9	2.1
10	.....	2.3	4.35	3.1	1.7	1.5	1.25	1.9	2.1
11	2.85	2.4	5.05	3.1	1.6	1.45	1.3	1.9	2.05
12	2.9	2.4	5.3	3.2	1.65	1.5	1.3	1.9	2.1
13	2.8	2.5	5.1	3.2	1.6	1.65	1.3	2.0	2.05
14	2.45	2.5	4.7	3.05	1.5	1.7	1.45	2.0	2.1
15	2.4	2.5	4.5	3.0	1.5	1.7	1.5	2.1	2.1
16	2.4	2.45	4.15	2.9	1.9	1.65	1.8	2.7	2.1
17	2.3	2.4	3.8	2.9	2.0	1.6	2.6	2.5	2.0
18	2.3	2.4	3.7	2.8	1.8	1.5	2.45	2.5	2.0
19	2.4	2.5	3.8	2.7	1.7	1.5	2.7	2.45	2.0
20	2.45	2.6	3.9	2.6	1.6	1.5	2.7	2.5	2.05
21	2.45	2.8	3.75	2.6	1.6	1.6	2.55	2.4	2.1
22	2.4	2.8	3.5	2.5	1.8	1.7	2.45	2.4	2.1
23	2.4	2.9	3.6	2.45	1.7	1.6	2.3	2.4	2.1
24	2.4	3.0	4.15	2.5	1.65	1.5	2.3	2.4	2.05
25	2.4	3.25	4.45	2.45	1.5	1.45	2.25	2.4	2.05
26	2.4	3.2	4.2	2.4	1.5	1.4	2.1	2.35	2.1
27	2.4	3.65	4.15	2.35	1.5	1.4	2.0	2.3	2.1
28	2.35	3.8	4.35	2.4	1.55	1.4	2.0	2.2	2.1
29	2.3	4.0	4.65	2.65	1.8	1.4	1.9	2.2	2.1
30	2.3	3.95	4.95	2.65	1.9	1.35	1.9	2.2	2.05
31	2.3	.....	4.95	.....	1.9	1.3	.....	2.2	.....

NOTE.—Ice present Jan. 1 to Mar. 13.

Daily discharge, in second-feet, of Lake Fork near Myton, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.
1	145	124	645	1,170	190	134	10	63	115
2	145	124	520	1,120	166	98	13	90	115
3	145	124	423	1,020	144	124	13	83	106
4	145	124	388	825	144	98	21	83	106
5	145	144	353	735	155	76	17	76	106
6	145	144	353	690	124	51	13	76	98
7	145	144	335	645	106	40	13	76	106
8	145	144	405	520	90	40	13	83	106
9	145	144	580	440	76	30	10	76	106
10	145	144	892	370	51	30	10	76	106
11	142	166	1,250	370	40	26	13	76	98
12	142	166	1,400	405	46	30	13	76	106
13	142	190	1,280	405	40	46	13	90	98
14	178	190	1,060	353	30	51	26	90	106
15	166	190	965	335	30	51	30	106	106
16	166	178	802	300	76	40	63	240	106
17	144	166	645	300	90	40	215	190	90
18	144	166	600	270	63	30	178	190	90
19	166	190	645	240	51	30	240	178	90
20	178	215	690	215	40	30	240	190	98
21	178	270	622	215	40	40	202	166	106
22	166	270	520	190	63	51	178	166	106
23	166	300	560	178	51	40	144	166	106
24	166	335	802	190	46	30	144	166	98
25	166	423	940	178	30	26	134	166	98
26	166	405	825	166	30	21	106	155	106
27	166	580	802	155	30	21	90	144	106
28	155	645	892	166	35	21	90	124	106
29	144	735	1,040	228	63	21	76	124	106
30	144	712	1,200	228	76	17	76	124	98
31	144	.....	1,200	.....	76	13	.....	124	.....

NOTE.—Daily discharge Mar. 1-13, estimated because of presence of ice. Discharge Mar. 14 to Nov. 30, determined from a rating curve well defined throughout.

Monthly discharge of Lake Fork near Myton, Utah, for 1910.

[Drainage area, 475 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January			[a] 144	0.303	0.35	8,850	D.
February			[a] 146	.308	.36	8,110	D.
March	178	142	154	.324	.37	9,470	C.
April	735	124	262	.552	.62	15,600	A.
May	1,400	335	762	1.60	1.84	46,900	A.
June	1,170	155	421	.886	.99	25,100	A.
July	190	30	73.9	.156	.18	4,540	A.
August	134	13	45.2	.095	.11	2,780	A.
September	240	10	80.1	.169	.19	4,770	A.
October	240	63	124	.261	.30	7,620	A.
November	115	90	103	.217	.24	6,130	A.
The period						143,000	

[a] Estimated.

UINTA RIVER NEAR WHITEROCKS, UTAH.

This station, which is located at the highway bridge on the Government road up Uinta Cañyon (usually known as the sawmill road), about 8 miles northeast of the Indian agency at Whiterocks, was established September 16, 1899, discontinued the latter part of 1904, reestablished August 13, 1907, and again discontinued November 30, 1910.

Pole Creek enters about a mile above the station and Whiterocks comes in several miles below.

No water is diverted from the stream above the station, but the United States Indian Office has constructed a series of irrigation canals which divert water at various points below.

The same gage was used from 1899 to 1904, inclusive. The gage that was established in August, 1907, was located a short distance upstream from the old gage and at a different datum. The present chain gage has no determined relation to this last gage. It was established on October 22, 1907, on the bridge about a mile downstream from the other gate.

The gage was read only when the hydrographer visited the station to make discharge measurements, and the discharge for intermediate days is estimated by comparison with the hydrographs of other streams in that locality.

As the stream bed is rough and the current swift at high and moderate stages, the discharge measurements, except at low stages, are apt to be considerably in error.

The relation between gage height and discharge is affected by ice during the winter season. Winter measurements are usually taken at riffles or open places in the channel.

Discharge measurements of Uinta River near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 15	R. H. Fletcher	68	94	1.48	*a*156
24	....do	68	88	1.32	*a*142
Feb. 8	....do	67	95	1.22	*a*145
26	....do	67	86	1.24	*a*146
Mar. 7	Freeman and Fletcher	67	74	1.22	117
17	R. H. Fletcher	68	82	1.32	141
25	....do	68	94	1.40	189
Apr. 7	....do	68	87	1.32	159
18	....do	72	102	1.45	224
30	....do	77	147	2.30	654
May 7	....do	74	122	1.80	429
17	....do	74	133	1.92	505
30	....do	77	159	2.20	769
June 4	....do	74	150	2.05	636
15	....do	73	117	1.78	398
25	....do	72	108	1.60	318
July 5	....do	74	120	1.78	422
19	....do	72	112	1.68	342
29	....do	75	128	1.90	437
Aug. 4	Fletcher and Palmer	73	115	1.74	381
16	R. H. Fletcher	73	103	1.60	258
30	....do	72	93	1.46	192
Sept. 6	....do	71	94	1.40	192
13	....do	72	93	1.45	207
29	....do	72	99	1.54	237
Oct. 6	....do	70	89	1.46	196
17	....do	73	108	1.56	265
26	....do	70	88	1.46	192
Nov. 3	....do	68	89	1.40	169
11	....do	68	84	1.38	161
22	....do	68	81	1.32	150

a Measurement through holes cut in ice. Gage height distorted.

Daily discharge, in second-feet, of Uinta River near Whiterocks, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	160	145	135	150	780	780	360	440	190	240	185
2	160	145	130	155	640	740	380	420	185	240	180
3	160	145	125	155	525	680	390	460	180	230	175
4	160	145	125	160	520	620	400	393	180	220	175
5	160	145	125	160	480	590	419	360	180	210	175
6	160	145	120	160	400	550	365	350	175	202	170
7	160	145	120	162	432	510	350	320	175	200	170
8	160	145	125	165	580	480	320	310	175	190	170
9	160	145	130	170	850	450	300	290	180	180	170
10	160	145	130	180	1,100	420	300	290	180	180	170
11	155	145	135	200	1,420	410	300	300	180	180	166
12	155	145	140	200	1,430	410	290	300	185	190	165
13	155	145	145	205	1,300	410	280	310	198	200	160
14	155	145	145	205	940	415	280	310	220	220	160
15	155	145	150	210	840	419	320	290	260	240	160
16	150	145	155	210	680	410	360	270	340	260	160
17	150	145	162	210	520	395	360	260	360	250	160
18	150	145	160	225	515	380	360	255	400	240	150
19	150	145	180	240	490	360	355	250	440	240	150
20	150	145	190	300	460	350	350	240	430	230	150
21	140	145	200	330	420	340	340	240	410	225	140
22	140	145	200	340	390	325	330	230	380	220	139
23	140	145	200	400	400	320	320	225	340	220	140
24	140	145	200	460	500	310	320	220	320	210	130
25	140	145	200	520	600	306	340	220	300	210	130
26	140	145	200	580	580	295	380	215	295	202	125
27	140	145	190	720	550	295	435	210	290	200	125
28	140	145	180	850	620	300	470	210	280	200	125
29	140	.....	160	850	720	320	505	205	240	190	125
30	140	.....	150	825	740	340	480	202	240	190	125
31	140	.....	150	.....	760	.....	460	195	.....	190	.....

NOTE.—Daily discharge determined by comparison with hydrographs of Lake Fork below forks and Uinta River at Fort Duchesne, except for Jan. 21 to Feb. 28, for which period the discharge was estimated from current meter measurements. Dicharge Mar. 7 to Nov. 22 obtained by applying to the rating curves the gage heights read on dates of measurements, instead of using the discharge as measured on those dates.

Monthly discharge of Uinta River near Whiterocks, Utah, for 1910.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	150	0.688	0.79	9,220
February	145	.665	.69	8,050
March	157	.720	.83	9,650
April	323	1.48	1.65	19,200
May	683	3.13	3.61	42,000
June	417	1.91	2.13	24,800
July	362	1.66	1.91	22,300
August	282	1.29	1.49	17,300
September	264	1.21	1.35	15,700
October	213	.977	1.13	13,100
November	154	.706	.79	9,160
The period				190,000

NOTE.—The accuracy of these estimates may be classed as C.

UINTA RIVER AT FORT DUCHESNE, UTAH.

This station, which is located at the wooden highway bridge on the road to Vernal, one-fourth of a mile from Fort Duchesne, Utah, was originally established on September 4, 1899, and continued until the end of 1904. It was also maintained for a brief period during 1906. The station was reestablished April 9, 1907, and again discontinued November 30, 1910.

The data obtained at this point show the amount of water contributed by this stream to Duchesne River, except the comparatively small amount diverted for irrigation below, and in connection with the records of the stations above on the Whiterocks and the Uinta they show the amount of water taken for irrigation by the numerous ditches on the Uinta and Whiterocks above the station. The upper tributaries, above irrigation diversions, afford excellent opportunities for storage and power development.

Practically the same datum was used for the gage up to and including 1906. The chain gage established April 9, 1907, has an entirely different datum. This gage was fastened to the bridge from which discharge measurements were made.

The flow of the stream is affected by ice for about four months during the winter season, and the accuracy of the results is somewhat impaired by eddies around the crib piers and by deposits of sediment brought down by Deep Creek during floods.

Discharge measurements of Uinta River at Fort Duchesne, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 18	R. H. Fletcher	70	174	8.60	[a] 150
Feb. 10	....do	45	89	8.50	[a] 121
22	....do	50	105	8.60	[a] 181
Mar. 16	....do	88	108	6.48	212
31	....do	88	111	6.50	200
Apr. 13	....do	90	115	6.55	203
27	....do	80	282	7.26	676
May 11	....do	80	365	7.80	1,280
25	....do	80	352	7.05	481
June 8	....do	90	116	6.60	211
22	....do	28	28	6.20	56
July 13	....do	24	20	5.88	19
27	....do	15	11	5.78	9
Aug. 5	....do	31	45	6.28	106
24	....do	27	41	6.06	41
Sept. 7	....do	25	35	6.00	30
27	....do	88	101	6.40	157
Oct. 11	....do	32	46	6.29	105
22	....do	90	114	6.48	183
Nov. 6	....do	90	105	6.46	158
19	....do	89	94	6.36	132

[a] Measurement taken through holes cut in ice. Gage height distorted.

Daily gage height, in feet, of Uinta River at Fort Duchesne, Utah, for 1910.

[Bertha L. Wouldhave, observer.]

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	6.4	7.2	7.0	6.05	6.2	5.9	6.3	6.4
2	.....	6.4	7.1	7.1	6.0	6.35	5.95	6.4	6.4
3	.....	6.4	7.0	7.0	6.0	6.4	5.95	6.4	6.4
4	.....	6.4	6.9	6.8	5.95	6.25	6.0	6.3	6.4
5	.....	6.4	6.8	6.8	6.05	6.2	6.0	6.3	6.4
6	8.1	6.4	6.8	6.7	6.0	6.1	6.0	6.2	6.4
7	7.95	6.4	6.8	6.65	6.0	6.0	6.0	6.2	6.4
8	7.8	6.4	7.0	6.55	6.0	5.95	5.95	6.2	6.4
9	7.7	6.4	7.2	6.55	5.9	5.9	5.9	6.2	6.4
10	7.6	6.4	7.5	6.4	5.9	5.9	5.9	6.3	6.4
11	7.2	6.45	7.8	6.4	5.9	5.9	5.9	6.3	6.4
12	6.5	6.5	7.7	6.4	5.9	5.9	5.9	6.3	6.4
13	6.4	6.5	7.6	6.4	5.9	6.1	5.9	6.35	6.4
14	6.4	6.5	7.45	6.35	5.9	6.0	6.15	6.4	6.4
15	6.4	6.5	7.3	6.3	5.85	6.05	6.25	6.45	6.35
16	6.45	6.45	7.1	6.25	5.9	6.0	6.3	6.6	6.35
17	6.4	6.5	7.1	6.3	5.9	6.0	6.5	6.55	6.35
18	6.4	6.5	7.0	6.3	5.9	5.95	6.55	6.5	6.3
19	6.45	6.5	7.0	6.2	5.9	5.95	6.5	6.5	6.3
20	6.5	6.65	7.0	6.2	5.85	5.95	6.55	6.5	6.3
21	6.5	6.7	6.9	6.2	5.9	5.95	6.5	6.5	6.3
22	6.5	6.7	6.8	6.2	6.0	6.05	6.4	6.5	6.25
23	6.5	6.8	6.8	6.15	5.9	6.0	6.5	6.45	6.3
24	6.5	6.9	6.85	6.15	5.9	6.0	6.4	6.4	6.3
25	6.5	6.95	7.0	6.1	5.85	5.9	6.3	6.4	6.3
26	6.55	7.05	6.9	6.1	5.75	5.9	6.35	6.4	6.3
27	6.5	7.2	6.85	6.1	5.6	5.9	6.35	6.4	6.25
28	6.5	7.4	7.0	6.1	5.7	5.9	6.35	6.4	6.25
29	6.45	7.4	7.1	6.2	6.0	6.0	6.35	6.4	6.25
30	6.4	7.35	7.05	6.15	6.25	6.0	6.3	6.4	6.25
31	6.4	.....	7.05	.....	6.2	6.0	.....	6.4	.....

NOTE.—Ice present Jan. 1 to Mar. 11.

Daily discharge, in second-feet, of Uinta River at Fort Duchesne, Utah, for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	200	147	616	446	35	79	19	109	147
2	200	147	527	527	25	128	26	147	147
3	200	147	446	446	28	147	26	147	147
4	200	147	373	307	22	94	33	109	147
5	200	147	307	307	38	79	33	169	147
6	200	147	307	248	30	53	33	79	147
7	200	147	307	222	30	33	33	79	147
8	200	147	446	173	30	26	26	79	147
9	200	147	616	173	19	19	19	79	147
10	200	147	928	113	19	19	19	109	147
11	200	169	1,290	113	19	19	19	169	147
12	218	191	1,160	113	19	19	19	109	147
13	170	191	1,040	113	19	53	19	128	147
14	170	191	873	98	19	33	66	147	147
15	170	191	713	82	14	43	94	169	128
16	195	169	527	69	19	33	109	241	128
17	170	191	527	82	19	33	191	216	128
18	170	191	446	82	19	26	216	191	109
19	195	191	446	56	19	26	191	191	109
20	215	269	446	56	14	26	216	191	109
21	215	297	373	56	19	26	191	191	109
22	215	297	307	56	33	43	147	191	94
23	210	361	307	46	19	33	191	169	109
24	210	433	340	46	19	33	147	147	109
25	210	473	446	36	14	19	109	147	109
26	225	553	373	40	6	19	128	147	109
27	205	616	340	40	1	19	128	147	94
28	205	818	446	40	3	19	128	147	94
29	169	818	527	62	33	33	128	147	94
30	147	765	486	52	94	33	109	147	94
31	147	.....	486	.....	79	33	.....	147	.....

NOTE.—Daily discharge determined as follows: Mar. 1 to 11, estimated because of presence of ice; Mar. 12 to 28, Apr. 16 to 26, June 26 to July 8, indirect method for shifting channels used; Mar. 29 to Apr. 15, July 9 to Nov. 30, discharge determined from a curve fairly well defined below 400 second-feet; discharge Apr. 27 to June 25 obtained from a curve well defined throughout.

Monthly discharge of Uinta River at Fort Duchesne, Utah, for 1910.

[Drainage area, 672 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	.....	.....	[a]151	0.225	0.26	9,280	D.
February	.....	.....	[a]149	.222	.23	8,280	D.
March	225	147	195	.290	.33	12,000	D.
April	818	147	295	.439	.49	17,600	C.
May	1,290	307	541	.805	.93	33,300	C.
June	527	36	143	.213	.24	8,510	B.
July	94	1	25.0	.037	.04	1,540	B.
August	147	19	41.9	.062	.07	2,580	B.
September	216	19	93.8	.140	.16	5,580	B.
October	241	79	144	.214	.25	8,850	B.
November	147	94	126	.188	.21	7,500	B.
December	.....	.....	.....	.....	.....	.....	
The year	.....	.....	.....	.....	.....	115,000	

[a] Estimated.

WHITEROCKS RIVER NEAR WHITEROCKS, UTAH.

This station, which is located at the mouth of the canyon, at the foot of "Dugway," on the road from the plateau to the river bottom, about 10 miles above the Indian agency at Whiterocks, and below

all important tributaries of the Whiterocks, was established April 18, 1899, and continued until the end of 1904. On April 11, 1907, it was reestablished at practically the same place and was again discontinued on November 30, 1910.

The nearest irrigation ditch is about 3 miles below the station. Excellent storage and power sites exist above all irrigation diversions.

The same gage and datum were used from the establishment of the station until the end of 1904. A new chain gage and datum were used from April 11, 1907, to May 8, 1908, and a second chain gage at a still different datum from May 9, 1908, to November 30, 1910.

Owing to the remoteness of this gage from any dwelling, daily gage observations have not been made, and the daily and monthly discharge tables have been computed by comparing the relatively frequent discharge measurements with the hydrographs of other streams in that section.

Measurements were made from a cable about 100 feet downstream from the gage.

As the stream bed is rather rough and the current is swift, measurements at high or medium stages are not very accurate. The daily and monthly discharge estimates, computed by the method outlined above, are necessarily only approximate.

Like other streams in this region, the river is icebound for several months in the winter.

Discharge measurements of Whiterocks River near Whiterocks, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 6	R. H. Fletcher	35	36	.....	[a] 61
25	do	32	36	.....	[a] 72
Feb. 9	do	35	38	.....	[a] 78
28	do	31	28	1.18	[b] 51
Mar. 8	do	30	27	1.20	[c] 46
18	do	30	28	1.30	53
27	do	31	33	1.38	75
Apr. 6	do	30	28	1.32	59
20	do	34	44	1.74	120
29	do	55	104	2.75	485
May 6	do	39	57	2.10	233
16	do	50	87	2.40	344
28	do	52	86	2.54	390
June 3	do	50	74	2.38	312
13	do	37	53	2.00	194
27	do	33	42	1.68	109
July 6	do	34	41	1.72	119
20	do	34	47	1.85	139
30	do	37	53	1.92	182
Aug. 3	do	36	51	1.90	177
15	do	34	44	1.75	126
29	do	33	38	1.65	101
Sept. 5	do	32	39	1.60	101
12	do	30	33	1.46	83
28	do	34	41	1.67	115
Oct. 5	do	33	39	1.58	106
15	do	32	35	1.56	94
25	do	33	35	1.58	101
Nov. 2	do	31	33	1.48	81
10	do	30	33	1.40	85
21	do	30	27	1.36	67

[a] Measured through ice about 2 miles below station.
[b] Ice present.
[c] Practically open-channel.

Daily discharge, in second-feet, of Whiterocks River near Whiterocks, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	60	75	50	55	390	400	145	160	100	100	80
2	60	75	50	55	360	460	145	170	100	100	79
3	60	75	50	55	320	328	145	170	100	100	75
4	60	75	50	55	280	320	140	160	100	100	75
5	60	75	50	55	240	310	140	150	100	96	75
6	60	75	50	59	232	300	125	140	95	95	70
7	60	75	50	60	220	280	120	130	90	90	70
8	60	75	48	65	280	260	110	120	80	85	70
9	60	75	45	70	460	250	100	110	80	80	70
10	60	75	45	80	730	240	90	100	75	80	68
11	60	75	50	80	1,040	225	80	110	75	80	70
12	60	75	50	100	1,040	215	65	120	76	80	70
13	60	75	50	100	880	200	60	140	85	80	70
14	60	75	50	100	630	195	60	140	90	85	70
15	60	75	50	80	500	185	100	132	120	93	65
16	70	60	50	80	335	180	140	120	180	100	65
17	70	60	55	80	330	175	210	120	260	100	65
18	70	60	57	80	320	170	210	110	290	100	65
19	70	60	60	100	300	160	170	110	330	100	65
20	70	60	70	130	280	155	158	110	310	100	65
21	70	60	75	160	260	150	195	110	290	100	64
22	70	60	80	200	240	140	170	110	260	100	65
23	70	60	80	220	240	130	130	110	220	100	65
24	70	60	80	300	280	120	130	110	210	95	65
25	70	60	80	320	300	120	120	110	200	96	65
26	70	50	80	360	340	115	110	110	140	90	60
27	70	50	66	400	300	116	110	110	120	85	60
28	70	50	65	460	386	120	140	110	114	85	60
29	70	.....	65	470	460	130	180	110	100	85	60
30	70	.....	65	440	430	140	176	110	100	80	60
31	70	.....	60	.....	420	.....	170	105	.....	80	.....

NOTE.—Daily discharge determined by comparison of hydrographs of Lake Fork below forks and Uinta River at Fort Duchesne, except for period Jan. 1 to Feb. 28, for which it was estimated from discharge measurements. Discharge on dates of actual measurement, Mar. 8 to Nov. 21, determined by applying to the rating curve the gage heights of the measurements.

Monthly discharge of Whiterocks River near Whiterocks, Utah, for 1910.

[Drainage area, 114 square miles.]

Month.	Discharge in second-feet.		Run-off.	
	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	65.2	0.572	0.66	4,010
February	67.0	.588	.61	3,720
March	58.9	.517	.60	3,620
April	162	1.42	1.58	9,640
May	414	3.63	4.18	25,500
June	210	1.84	2.05	12,500
July	134	1.18	1.36	8,240
August	123	1.08	1.24	7,560
September	150	1.32	1.47	8,920
October	91.6	.804	.93	5,630
November	67.5	.592	.66	4,020
The period	.....	.....	.....	93,400

NOTE.—The accuracy of these estimates may be classed as C.

WHITE RIVER BASIN.

GENERAL FEATURES.

White River rises in Trappers Lake, which lies 9,500 feet above sea level in a small mountain basin of the White River Plateau in eastern Garfield County, Colo., and flows westward to its junction with Green River in west-central Uinta County, Utah. Throughout its course it occupies a narrow mountainous valley, with alternating parks and canyons, entering the longest and deepest of the canyons, in which it continues to its mouth, about 8 miles east of the Colorado-Utah State line.

The basin comprises an arid, broken, and much eroded plateau region, which topographically is a continuation of the Grand River Mesa south of Grand River. The headwater portion covers the greater area and is called the White River Plateau; below this and to the south is the Roan or Book Cliffs Plateau. Fragmentary plateaus also occur along the northern side of the river.

Numerous small streams, among which are Marvine Creek and South Fork, join the White in the upper, mountainous portion of the basin. Douglas, Piceance, and Evacuation creeks, draining the Book Cliffs Plateau, enter White River from the south. In the spring these creeks carry considerable water, derived mainly from melting snow, but in the summer they are very nearly dry.

The mean annual precipitation recorded at Meeker is 15.9 inches; farther west and at lower elevations it is undoubtedly much less.

NORTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

This station, which is located at Genier's ranch, about 1½ miles above Buford, was established May 24, 1910, by the State engineer of Colorado, by whom the records are furnished. The station is about 5 miles below the site of a station established by the United States Geological Survey July 28, 1903, and discontinued October 31, 1906. No large tributaries enter between the former and the present site.

A staff gage is spiked to the support of a footbridge.

The bed of the stream is composed of cobbles and bowlders and is permanent. The right bank is overflowed at extreme high stages. The measuring section is good.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of North Fork of White River near Buford, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	C. L. Chatfield	68	152	2.0	656
June 23	do	.....	127	1.6	505
Aug. 15	do	49	93	1.0	262
Nov. 26	do	.....	79	.8	208

Daily gage height, in feet, of North Fork of White River near Buford, Colo., for 1910.

[Mrs. H. Genier, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.95	1.4	1.05	0.9	0.8	0.8	0.7
2	.....	2.95	1.4	1.0	.9	.85	.8	.7
3	.....	3.1	1.4	1.0	1.0	.9	.9	.8
4	.....	3.15	1.4	1.0	1.3	.9	.9	.8
5	.....	2.9	1.4	1.1	1.1	.9	.8	.85
6	.....	2.9	1.4	1.05	1.1	.85	.8	.85
7	.....	2.9	1.4	1.0	1.0	.8	.8	.85
8	.....	2.8	1.3	1.0	.9	.8	.8	.8
9	.....	2.6	1.3	1.0	.9	.8	.8	.8
10	.....	2.5	1.3	.95	.9	.8	.8	.8
11	.....	2.5	1.3	.95	.9	.8	.8	.....
12	.....	2.5	1.3	1.1	.9	.8	.8	.....
13	.....	2.5	1.3	1.0	.95	.8	.8	.....
14	.....	2.3	1.2	1.0	.95	.8	.8	.....
15	.....	2.3	1.2	.9	.9	.8	.8	.....
16	.....	2.2	1.2	.9	.9	.8	.8	.....
17	.....	2.0	1.2	.9	.9	.85	.8	.....
18	.....	2.0	1.2	.9	.9	.9	.8	.....
19	.....	1.8	1.2	.9	.9	.9	.8	.....
20	.....	1.8	1.2	.9	.9	.9	.85	.....
21	.....	1.7	1.1	.9	.95	.95	.85	.....
22	.....	1.7	1.1	.9	.95	.9	.8	.....
23	.....	1.65	1.0	.9	.9	.8	.8	.....
24	2.1	1.6	1.0	.9	.9	.85	.8	.....
25	2.1	1.6	1.0	.9	.9	.85	.8	.....
26	2.15	1.55	1.0	.9	.9	.8	.8	.....
27	2.15	1.5	1.0	.9	.9	.8	.8	.....
28	2.4	1.5	1.0	.9	.9	.8	.8	.....
29	2.65	1.5	1.15	.9	.9	.8	.8	.....
30	2.7	1.45	1.1	.9	.8	.8	.7	.....
31	2.9	.....	1.1	.9	.....	.8	.....	.....

Daily discharge, in second-feet, of North Fork of White River near Buford, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1,123	415	284	235	208	208	185
2	.....	1,123	415	266	235	222	208	185
3	.....	1,198	415	266	266	235	235	208
4	.....	1,223	415	266	376	235	235	208
5	.....	1,098	415	301	301	235	208	222
6	.....	1,098	415	284	301	222	208	222
7	.....	1,098	415	266	266	208	208	222
8	.....	1,048	376	266	235	208	208	208
9	.....	946	376	266	235	208	208	208
10	.....	896	376	250	235	208	208	208
11	.....	896	376	250	235	208	208	.....
12	.....	896	376	301	235	208	208	.....
13	.....	896	376	266	250	208	208	.....
14	.....	801	338	266	250	208	208	.....
15	.....	801	338	235	235	208	208	.....
16	.....	755	338	235	235	208	208	.....
17	.....	666	338	235	235	222	208	.....
18	.....	666	338	235	235	235	208	.....
19	.....	579	338	235	235	235	208	.....
20	.....	579	338	235	235	235	222	.....
21	.....	537	301	235	250	250	222	.....
22	.....	537	301	235	250	235	208	.....
23	.....	516	266	235	235	208	208	.....
24	710	496	266	235	235	222	208	.....
25	710	496	266	235	235	222	208	.....
26	732	476	266	235	235	208	208	.....
27	732	455	266	235	235	208	208	.....
28	848	455	266	235	235	208	208	.....
29	971	455	320	235	235	208	208	.....
30	998	435	301	235	208	208	185	.....
31	1,098	.....	301	235	.....	208	.....	.....

NOTE.—Mean daily discharge Dec. 11–31 estimated at 208 second-feet.

Monthly discharge of North Fork of White River near Buford, Colo., for 1910.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 24–31	1,100	710	850	3.54	1.05	13,500
June	1,220	435	775	3.23	3.60	46,100
July	415	266	343	1.43	1.65	21,100
August	301	235	251	1.05	1.21	15,500
September	301	208	247	1.03	1.15	14,700
October	250	208	218	.908	1.05	13,400
November	235	185	210	.874	.98	12,500
December	.....	.....	208	.867	1.00	12,800
The period	.....	.....	.....	.....	.....	150,000

WHITE RIVER AT MEEKER, COLO.

This station, which is located at Van Cleave's ranch, about half a mile southeast of Meeker, Colo., was established by the United States Geological Survey May 24, 1901, discontinued October 31, 1906, and reestablished May 22, 1910, by the State engineer of Colorado, by

whom the records are furnished. The present station is about 50 feet above the site originally used.

A staff gage is bolted to the right abutment of the road bridge and an automatic gage was installed October 20, 1910. The datum of the present gage is 0.43 foot above the datum of the United States Geological Survey gage established in 1901.

The bed of the stream is composed of cobbles and is permanent. The banks are overflowed at extreme high water.

Discharge measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of White River at Meeker, Colo., in 1910.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
		Sq. ft.	*Feet.*	*Sec.-ft.*
May 22	C. L. Chatfield	278	4.15	1,080
June 22	do	267	4.10	1,070
Aug. 20	do	184	1.02	358
22	do	188	1.10	391
23	do	183	1.06	373
Nov. 26	do	178	1.00	360

Daily gage height, in feet, of White River at Meeker, Colo., for 1910.

[Walter Van Cleave, observer.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		5.45	3.6	3.2	0.95	1.0	0.95	0.9
2		5.4	3.5	3.1	1.0	1.0	.95	.9
3			3.5	3.1	1.05	1.0	.95	1.0
4			3.45	3.0	1.25	1.0	1.0	1.0
5			3.6	3.15	1.15	1.0	.95	.8
6			3.5	3.0	1.05	.95	.9	.9
7	4.35		3.4	3.0	1.0	1.0	.9	1.05
8			3.3	3.0	1.0	.95	.9	1.0
9			3.3	2.9	1.0	.95	.95	1.0
10			3.3	2.9	1.0	.95	.9	
11			3.3	2.9	.95	1.0	.95	
12			3.3	3.0	.95	.95	.95	
13			3.2	3.1	1.0	1.0	.95	
14			3.2	1.05	1.1	1.0	.9	
15			3.2	1.1	1.0	1.0	.95	
16			3.2	1.05	1.0	1.05	.95	
17			3.2	1.05	1.0	1.05	.9	
18			3.2	1.05	1.0	1.05	.95	
19			3.25	1.05	1.0	1.0	1.0	
20			3.15	1.05	.95	.95	.8	
21			3.1	1.0	1.0	1.0	.9	
22	4.15	4.0	3.0	1.0	.95	1.0	.95	
23	4.15	3.95	3.0	1.05	1.0	1.0	1.0	
24	4.25	3.9	3.0	1.0	1.0	1.0	.95	
25	4.35	3.8	3.0	.95	.95	1.0	.95	
26	4.55	3.7	2.95	1.0	.95	1.0	.95	
27	4.55	3.6	2.9	1.0	.95	.95	.95	
28	4.75	3.6	3.25	1.0	.95	.95	.95	
29	5.05	3.8	3.2	1.0	.95	1.0	1.0	
30	5.15	3.7	3.25	1.0	.95	.95	.95	
31	5.3		3.15	1.0		.95		

Daily discharge, in second-feet, of White River at Meeker, Colo., for 1910.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2,846	611	414	338	355	338	322
2	.....	2,756	556	371	355	355	338	322
3	.....	2,700	556	371	374	355	338	355
4	.....	2,700	531	328	458	355	355	355
5	.....	2,600	611	392	413	355	338	292
6	.....	2,600	556	328	374	338	322	322
7	1,186	2,500	506	328	355	355	322	374
8	1,100	2,400	460	328	355	338	322	355
9	1,100	2,300	460	288	355	338	338	355
10	1,100	2,200	460	288	355	338	322	.....
11	1,100	2,100	460	288	338	355	338	.....
12	1,100	2,000	460	328	338	338	338	.....
13	1,050	1,900	414	371	355	355	338	.....
14	1,050	1,800	414	374	392	355	322	.....
15	1,050	1,700	414	392	355	355	338	.....
16	1,050	1,600	414	374	355	374	338	.....
17	1,050	1,500	414	374	355	374	322	.....
18	1,004	1,400	414	374	355	374	338	.....
19	1,004	1,300	437	374	355	355	355	.....
20	1,004	1,200	392	374	338	338	292	.....
21	1,004	1,000	371	355	355	355	322	.....
22	1,004	881	328	355	338	355	338	.....
23	1,004	844	328	374	355	355	355	.....
24	1,091	806	328	355	355	355	338	.....
25	1,186	736	328	338	338	355	338	.....
26	1,406	671	308	355	338	355	338	.....
27	1,406	611	285	355	338	338	338	.....
28	1,676	611	437	355	338	338	338	.....
29	2,164	736	414	355	338	355	355	.....
30	2,328	671	437	355	338	338	338	.....
31	2,576	.....	392	355	.....	338	.....	.....

NOTE.—Discharge interpolated May 8 to 21 and June 3 to 21.

Monthly discharge of White River at Meeker, Colo., for 1910.

[Drainage area, 634 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
May 7-31	2,580	1,000	1,270	2.01	1.87	63,100
June	2,850	611	1,660	2.62	2.91	98,800
July	611	308	435	.686	.79	26,700
August	414	288	354	.558	.64	21,800
September	458	338	357	.563	.63	21,200
October	374	338	351	.554	.64	21,600
November	355	292	335	.529	.59	19,900
December 1-9	374	292	339	.535	.18	6,050
The period	.....	.....	.....	.....	.....	279,000

SOUTH FORK OF WHITE RIVER NEAR BUFORD, COLO.

This station, which is located at the private road bridge at Shephard's ranch, about 7 miles above Buford, Colo., was established May 29, 1910, by the State engineer of Colorado, by whom the records are furnished. The station is half a mile above the site of the station

established by the United States Geological Survey July 25, 1903, and discontinued October 31, 1906.

A vertical staff gage is spiked to a pier of the road bridge. From May 29 to June 24, 1910, the State engineer's gage was located at a highway bridge one-half mile below Shephard's ranch. The relation between the two gages has not been determined.

The bed of the stream is composed of gravel and is fairly permanent. The left bank is overflowed at extreme high stages. The measuring section is good.

High-stage measurements are made from the bridge; low-stage measurements are made by wading.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of South Fork of White River near Buford, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Old gage.	New gage.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
June 24	C. L. Chatfield	54	126	3.50	1.80	522
Aug. 19	do	59	93	2.60	.40	125
Nov. 25	do	59	81	2.45	.20	90

Daily gage height, in feet, of South Fork of White River near Buford, Colo., for 1910.

[Hugh Jones, observer.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.4	1.4	0.7	0.4	0.3	0.3	0.2	16	4.3	0.8	0.6	0.4	0.3	0.3	0.2
2	5.8	1.3	.7	.4	.3	.3	.2	17	4.2	.8	.6	.4	.3	.3	.2
3	6.2	1.2	.7	.4	.3	.3	.2	18	4.0	.8	.6	.4	.3	.3	.....
4	6.4	1.1	.6	.4	.3	.3	.2	19	3.9	.8	.6	.4	.4	.3	.....
5	5.8	1.2	.6	.4	.3	.3	.2	20	3.7	.8	.6	.4	.3	.2	.....
6	5.6	1.1	.6	.4	.3	.3	.2	21	3.5	.8	.5	.4	.3	.2	.....
7	5.5	1.0	.6	.4	.3	.3	.2	22	3.5	.8	.5	.4	.3	.2	.....
8	5.8	1.0	.6	.4	.3	.3	.2	23	3.4	.7	.5	.4	.3	.2	.....
9	4.9	.9	.6	.4	.3	.3	.2	24	3.5	.6	.5	.4	.3	.2	.....
10	4.7	.9	.6	.4	.3	.3	.2	25	1.8	.6	.4	.3	.3	.2	.....
11	4.7	.9	.6	.4	.3	.3	.2	26	1.6	.6	.4	.3	.3	.2	.....
12	4.7	.9	.6	.5	.3	.3	.2	27	1.5	.6	.4	.3	.3	.2	.....
13	4.6	.8	.6	.5	.3	.3	.2	28	1.5	1.1	.4	.3	.3	.2	.....
14	4.5	.8	.6	.4	.3	.3	.2	29	1.5	.8	.4	.3	.3	.2	.....
15	4.5	.8	.6	.4	.3	.3	.2	30	1.4	.7	.4	.3	.3	.2	.....
								31	.....	.7	.4	.....	.3	.....	.....

NOTE.—Beginning June 25 the gage heights refer to a different datum and section.

Daily discharge, in second-feet, of South Fork of White River near Buford, Colo., for 1910.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,295	397	200	128	108	108	90	16	1,015	225	175	128	108	108	90
2	1,930	367	200	128	108	108	90	17	955	225	175	128	108	108	90
3	2,175	337	200	128	108	108	90	18	830	225	175	128	108	108	.....
4	2,295	308	175	128	108	108	90	19	765	225	175	128	128	108	.....
5	1,930	337	175	128	108	108	90	20	645	225	175	128	108	90	.....
6	1,810	308	175	128	108	108	90	21	525	225	150	128	108	90	.....
7	1,750	280	175	128	108	108	90	22	525	225	150	128	108	90	.....
8	1,930	280	175	128	108	108	90	23	465	200	150	128	108	90	.....
9	1,380	252	175	128	108	108	90	24	525	175	150	128	108	90	.....
10	1,260	252	175	128	108	108	90	25	522	175	128	108	108	90	.....
11	1,260	252	175	128	108	108	90	26	459	175	128	108	108	90	.....
12	1,260	252	175	150	108	108	90	27	428	175	128	108	108	90	.....
13	1,200	225	175	150	108	108	90	28	428	308	128	108	108	90	.....
14	1,140	225	175	128	108	108	90	29	428	225	128	108	108	90	.....
15	1,140	225	175	128	108	108	90	30	397	200	128	108	108	90	.....
								31	.....	200	128	.....	108	.....	.....

Monthly discharge of South Fork of White River near Buford, Colo., for 1910.

[Drainage area, 148 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
June	2,300	397	1,120	7.72	8.61	66,800
July	397	175	248	1.68	1.94	15,200
August	200	128	164	1.11	1.28	10,100
September	150	108	125	.844	.94	7,440
October	128	108	109	.736	.85	6,700
November	108	90	101	.682	.76	6,010
December 1–17	90	90	90.0	.608	.38	3,030
The period	.....	.....	.....	.....	.....	115,000

PRICE RIVER BASIN.

GENERAL FEATURES.

Price River rises in the Wasatch Mountains in the southeastern part of Utah County, flows southeastward, and unites with Green River at a point about 14 miles above Green River, Utah. The main source of supply is the snow in the upper reaches of the basin, where elevations range from 8,000 to 9,000 feet. The basin comprises about 1,500 square miles of extremely rough and rugged country. The predominant rock is a loose and badly disintegrated sandstone. The soil is scanty and supports practically no vegetation except small groves of scrubby cedar and a few scattered pines. The original sparse underbrush and grass have been almost entirely tramped out by sheep and cattle.

The river is subject to floods in the spring and early summer, during which time it carries immense quantities of sediment. Gordon and

Pleasant creeks, the principal tributaries, are both short, steep streams and enter from the west almost at right angles.

PRICE RIVER NEAR HELPER, UTAH.

This station, which is located at an old ford crossing in the settlement of Spring Glen, about 3 miles south of Helper, Utah, and about 350 feet west of the tracks of the Denver & Rio Grande Railroad, was established February 21, 1904.

This station is below Pleasant Creek and White River, the two principal tributaries above, and is above Gordon Creek, which enters about 5 miles below, and Grassy Trail Creek, which enters about 35 miles below. There are no important diversions above.

The datum of the original chain gage remained unchanged until the gage was washed out by high water April 11, 1907. It was replaced by a temporary gage June 23, 1907, and by a permanent gage July 16, 1907. All gage heights after June 22, 1907, are referred to a new datum 0.7 foot above the original datum.

Discharge measurements are made from a car and cable.

A fair estimate may be made of winter flow, though ice is usually rather heavy. The bed of the stream is somewhat shifting, but the records may, on the whole, be considered good.

Discharge measurements of Price River near Helper, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 27	E. S. Fuller	62	190	4.40	1,120
June 10	do	60	99	3.20	158
July 21	G. H. Canfield	57	62	2.79	54
Aug. 25	do	39	45	2.65	32
Oct. 1	do	50	47	2.70	38

Daily gage height, in feet, of Price River near Helper, Utah, for 1910.

[Ada Ostberg, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.6	3.5	2.9	2.7	2.6	2.7	2.7	2.6
2		4.5	3.4	2.9	2.7	2.6	3.0	2.7	2.6
3		4.5	3.4	2.8	2.7	2.6	2.9	2.7	2.7
4		4.4	3.4	2.8	2.7	2.6	2.8	2.7	2.7
5		4.3	3.3	2.7	2.7	2.6	2.8	2.7	2.7
6		4.3	3.3	2.7	2.7	2.6	2.7	2.7	2.6
7		4.2	3.2	2.7	2.7	2.6	2.7	2.7	2.6
8		4.2	3.2	2.7	2.7	2.6	2.7	2.8	2.6
9		4.2	3.1	2.7	2.6	2.6	2.7	2.8	2.6
10		4.3	3.1	2.7	2.6	2.6	2.7	2.7	2.7
11		4.3	3.1	2.7	2.6	2.7	2.7	2.7	2.7
12		4.3	3.1	2.7	2.6	2.7	2.9	2.7	2.7
13	4.1	4.4	3.1	2.7	2.5	3.2	2.8	2.7	2.7
14	4.0	4.4	3.1	2.7	2.5	2.8	2.8	2.7	2.7
15	3.9	4.3	3.3	2.85	2.5	2.8	2.8	2.7	2.7

Daily gage height, in feet, of Price River near Helper, Utah, for 1910—Continued.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	3.8	4.2	3.3	2.7	2.7	2.8	3.4	2.7	2.7
17	3.8	4.2	3.3	2.7	2.6	3.9	3.4	2.7	2.7
18	3.8	4.1	3.3	2.7	2.6	3.0	3.2	2.7	2.7
19	3.9	4.0	2.9	2.7	2.6	2.9	3.0	2.7	2.8
20	4.0	3.9	2.9	2.7	2.6	2.9	2.9	2.7	3.0
21	4.1	3.9	2.8	2.7	2.6	2.8	2.8	2.7	3.0
22	4.3	3.8	2.8	2.7	2.6	2.8	2.8	2.8	3.1
23	4.2	3.8	2.8	2.7	2.6	2.7	2.8	2.8	3.1
24	4.1	3.8	2.8	2.7	2.6	2.7	2.8	2.8	2.7
25	4.2	3.8	2.8	2.7	2.6	2.7	2.8	2.7	3.0
26	4.3	3.7	2.8	2.7	2.6	2.7	2.8	2.7	2.8
27	4.5	3.7	2.8	2.7	2.6	2.7	2.7	2.7	2.9
28	4.6	3.6	2.8	2.7	3.35	2.7	2.7	2.7	2.8
29	4.6	3.6	3.0	2.8	2.7	2.7	2.7	2.6	2.7
30	4.7	3.6	2.9	3.0	2.6	2.7	2.7	2.6	2.6
31	.....	3.5	.....	2.7	2.6	.....	2.7	.....	2.6

NOTE.—Gage heights Jan. 1 to Apr. 10 are not published as they exhibit a variable error which can not be corrected by means of information at hand. Daily discharge determined from a well-defined discharge rating curve. Discharge interpolated for days of missing gage heights.

Daily discharge, in second-feet, of Price River near Helper, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	53	24	53	370	1,350	307	72	37	24	37	37	24
2	53	24	53	519	1,230	252	72	37	24	95	37	24
3	53	24	24	519	1,230	252	53	37	24	72	37	37
4	53	24	24	519	1,120	252	53	37	24	53	37	37
5	24	24	24	902	1,010	204	37	37	24	53	37	37
6	37	24	24	902	1,010	204	37	37	24	37	37	24
7	37	24	24	519	902	161	37	37	24	37	37	24
8	440	24	37	370	902	161	37	37	24	37	53	24
9	519	24	37	800	902	125	37	24	24	37	53	24
10	519	24	37	902	1,010	125	37	24	24	37	37	37
11	519	24	37	868	1,010	125	37	24	37	37	37	37
12	37	53	24	834	1,010	125	37	24	37	72	37	37
13	37	53	24	800	1,120	125	37	14	161	53	37	37
14	37	53	72	702	1,120	125	37	14	53	53	37	37
15	197	53	66	607	1,010	204	62	14	53	53	37	37
16	357	53	59	519	902	204	37	37	53	252	37	37
17	519	53	53	519	902	204	37	24	607	252	37	37
18	440	53	53	519	800	204	37	24	95	161	37	37
19	440	53	607	607	702	72	37	24	72	95	37	53
20	37	53	1,470	702	607	72	37	24	72	72	37	95
21	37	53	1,350	800	607	53	37	24	53	53	37	95
22	37	53	370	1,010	519	53	37	24	53	53	53	125
23	24	53	307	902	519	53	37	24	37	53	53	125
24	24	53	161	800	519	53	37	24	37	53	53	37
25	24	53	307	902	519	53	37	24	37	53	37	95
26	72	53	902	1,010	440	53	37	24	37	53	37	53
27	72	37	902	1,230	440	53	37	24	37	37	37	72
28	24	37	902	1,350	370	53	37	228	37	37	37	53
29	24	.....	1,010	1,350	370	95	53	37	37	37	24	37
30	24	.....	440	1,470	370	72	95	24	37	37	24	24
31	24	.....	405	.....	307	.....	37	24	.....	37	.....	24

Monthly discharge of Price River near Helper, Utah, for 1910.

[Drainage area, 530 square miles.]

Month	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	519	24	155	0.292	0.34	9,530	C.
February	53	24	40.5	.076	.08	2,250	C.
March	1,470	24	318	.600	.69	19,600	C.
April	1,470	370	794	1.50	1.67	47,200	B.
May	1,350	307	801	1.51	1.74	49,300	A.
June	307	53	136	.257	.29	8,090	A.
July	95	37	43.5	.082	.09	2,670	A.
August	228	14	33.8	.064	.07	2,080	A.
September	607	24	62.7	.118	.13	3 730	A.
October	252	37	67.7	.128	.15	4 160	A.
November	53	24	38.8	.073	.08	2,310	A.
December	125	24	47.6	.090	.10	2,930	B.
The year	1,470	14	212	.400	5.43	154,000	

PRICE RIVER AT WOODSIDE, UTAH.

This station is located at the Denver & Rio Grande Railroad bridge crossing Price River at Woodside, about 8 miles downstream from a proposed diversion dam for an irrigation project and about 15 miles above the junction of the Price with Grand River. By making due allowance for a few small tributaries entering the river between the dam site and station the records at this point will indicate the available water supply for that project.

Gage heights are obtained by measuring from a fixed point on the bridge to water surface.

These data are published as furnished by Mr. H. W. Sheley, a consulting engineer of Salt Lake City, Utah.

Discharge measurements of Price River at Woodside, Utah, in 1909-10.

Date.	Hydrographer.	Area of section.	Gage height.	Discharge.
1909.		*Sq. ft.*	*Feet.*	*Sec. ft.*
July 21	H. W. Sheley	195	10.2	800
22	do	74.3	11.5	187
23	do	278	9.1	1,080
24	do	475	6.7	3,500
Aug. 23	do		11.0	245
26	do	80	11.4	125
30	do	53.6	11.7	93
31	do	393	7.45	3,000
31	do	458	6.6	3,910
31	do	505	6.0	4,560
31	do	550	5.35	4,210
Sept. 1	do	626	4.4	5,720
1	do	825	1.8	8,140
6	do	478	6.15	3,250
17	do	64	11.8	118
24	do	63	11.7	121
Oct. 18	do	50.9	12.1	75
1910.				
Mar. 25	E. S. Fuller	118	10.25	748
May 10	H. W. Sheley	238	9.2	1,276
June 16	do	36.8	10.8	68
July 12	do	16.4	11.3	22
Nov. 13	do	30.1	11.3	38

NOTE.—All measurements during 1909 and that on Nov. 13, 1910, were made with floats; other measurements in 1910 were made with a current meter. All float measurements have been reduced by applying a coefficient varying from 0.85 to 1.0. Gage heights represent depths of water surface below a fixed point on Denver & Rio Grande Railroad bridge.

Monthly discharge of Price River at Woodside, Utah, for 1909-10.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1909.				
October	95	64	74	4,600
November	135	64	80	4,800
December	.....	.....	73	4,400
1910.				
January	.....	.....	70	4,300
February	.....	.....	70	4,200
March	2,870	270	792	48,700
April	1,880	465	918	54,600
May	1,710	480	1,102	67,800
June	[a] 1,300	37	187	11,100
July	1,600	0	114	7,000
August	450	0	41	2,500
September	1,700	0	221	13,200
October	2,750	59	207	12,700
November	370	38	128	7,600
December	150	68	92	5,600
The year	2,870	0	330	239,000

[a] Not mean for a day, but maximum.

SAN RAFAEL RIVER BASIN.

GENERAL FEATURES.

San Rafael River is formed in the western part of Emery County, crosses the central part of the county in a general southeasterly direction, and enters Green River about 36 miles below the mouth of the Price. The river has three principal branches, Ferron, Cottonwood, and Huntington creeks, which rise in the Wasatch Plateau at altitudes of about 10,000 feet above sea level. These streams fall rapidly in their upper courses and leave the plateau through almost impassable canyons cut in its eastern wall overlooking Castle Valley. They unite below Castledale, and the stream formed by their combined waters flows southeastward through the San Rafael Swell in a deep, narrow canyon, from which it emerges to flow across a low, broken country to its junction with the Green. The water of this river is derived chiefly from the melting snow on the high plateau. The drainage area of this basin is 2,390 square miles.

SAN RAFAEL RIVER NEAR GREEN RIVER, UTAH.

This station, which is located at the county bridge on the road from Green River to Hanksville, about 16 miles southwest of Green River, Utah, and about three-fourths of a mile below the Morris ranch dam, was established May 5, 1909. It is below all important tributaries and diversions.

The staff gage is nailed securely to the southwest pier of the bridge from which discharge measurements are made. The gage datum has remained unchanged since the station was established.

The winter flow is affected by ice, and as the bed of the stream shifts somewhat frequent measurements must be made in order to get satisfactory records.

Discharge measurements of San Rafael River near Green River, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 26	E. S. Fuller	69	401	4.32	1,410
July 28	G. H. Canfield	22	15	.65	7.4
Oct. 2	Canfield and Dort	43	35	1.10	54
Dec. 2	G. H. Canfield	45	50.6	1.55	80

Daily gage height, in feet, of San Rafael River near Green River, Utah, for 1910.

[E. F. Marshall, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.4	2.1	4.5	3.8	3.15	1.15	0.6	1.15	1.5	1.7
2		3.8	1.85	4.2	3.6	2.6	1.05	.75	1.2	1.6	1.85
3		5.15	2.05	3.95	3.55	2.05	1.1	.75	1.05	1.45	1.65
4		5.4	2.3	3.75	3.5	1.95	1.05	3.7	1.15	1.35	1.75
5		5.6	2.05	3.9	3.4	1.95	1.0	2.25	1.25	1.25	1.75
6		4.95	2.2	3.65	3.15	1.8	1.0	1.65	1.15	1.15	1.6
7		4.0	2.15	3.45	3.0	1.55	1.05	1.65	1.1	1.15	1.7
8		3.35	2.3	3.45	2.55	1.45	.95	1.35	1.05	1.25	1.55
9		3.15	2.15	4.05	2.55	1.35	.85	1.25	1.05	1.35	1.5
10		2.95	2.3	4.55	2.45	1.25	.7	.95	1.05	1.25	1.6
11		2.6	2.3	5.25	2.25	1.15	.55	.8	1.05	1.45	1.7
12		2.35	2.3	5.3	2.15	1.15	2.85	.7	1.05	1.35	1.9
13		2.5	2.45	5.2	2.0	1.0	1.4	.6	1.1	1.2	2.0
14		2.4	2.3	5.1	2.05	1.2	1.2	.6	1.2	1.4	1.95
15		2.2	2.85	5.0	2.0	1.05	1.25	.5	1.3	2.15	1.85
16		2.5	2.5	4.85	1.95	1.8	1.35	2.35	6.2	2.75	1.75
17		2.35	2.65	4.35	1.9	2.35	1.15	7.2	5.55	2.15	1.7
18		2.2	2.95	3.9	1.85	1.75	1.05	2.75	2.5	1.8	1.6
19		2.3	2.7	3.7	1.75	1.35	.95	2.7	2.15	1.65	1.7
20		2.45	3.0	3.65	1.6	1.15	.85	2.55	2.1	2.3	1.55
21		2.25	3.3	3.55	1.6	1.25	1.05	2.15	1.85	2.0	1.7
22		2.25	3.1	3.4	1.5	1.2	.8	2.45	1.95	1.85	1.65
23		2.3	2.9	3.15	1.4	1.0	.55	2.25	2.0	1.75	1.6
24		2.1	3.4	3.3	1.4	1.05	.5	1.8	2.4	1.6	1.5
25		2.3	4.3	3.2	1.35	.95	.5	1.45	1.8	1.6	1.45
26		2.2	4.15	3.35	1.25	.9	.5	1.4	1.9	1.9	1.45
27	2.7	2.2	4.8	3.3	1.15	.75	.5	1.15	1.85	1.8	1.65
28	2.45	2.3	4.9	3.6	1.25	.65	.9	1.2	2.0	1.7	1.7
29		2.25	5.0	3.65	2.0	1.3	.5	1.1	1.9	1.75	1.65
30		1.95	4.8	3.75	2.85	1.4	.65	1.15	1.55	1.55	1.75
31		1.9		3.8		1.6	.65		1.45		1.8

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for 1910.

Day.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		475	375	1,530	900	492	57	4	57	74	102
2		1,100	310	1,340	800	316	46	16	63	88	126
3		1,990	360	1,190	780	193	51	16	46	68	95
4		2,180	440	1,080	750	176	46	702	57	56	110
5		2,330	360	1,160	690	176	40	232	70	45	110
6		1,840	405	1,020	590	152	40	128	57	36	88
7		1,220	390	925	530	112	46	128	51	36	102
8		875	440	925	360	98	35	83	46	45	81
9		775	390	1,240	360	83	25	70	46	56	74
10		685	440	1,560	320	70	11	35	46	45	88

Daily discharge, in second-feet, of San Rafael River near Green River, Utah, for 1910—Con.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.....	545	440	2,070	270	57	2	20	46	68	102
12	.....	458	440	2,100	240	57	390	11	46	56	134
13	.....	510	492	2,030	200	40	90	4	51	40	150
14	.....	475	440	1,960	205	63	63	4	63	62	142
15	.....	405	645	1,880	185	46	70	0	76	177	126
16	.....	510	510	1,750	176	152	83	254	2,250	310	110
17	.....	458	565	1,400	168	254	57	3,040	1,770	177	102
18	.....	405	685	1,120	160	144	46	359	246	118	88
19	.....	440	585	990	144	83	35	344	177	95	102
20	.....	492	705	950	120	57	25	303	168	206	81
21	.....	422	850	890	120	70	46	212	126	150	102
22	.....	422	750	810	105	63	20	278	142	126	95
23	.....	440	665	690	90	40	2	232	150	110	88
24	.....	375	900	750	90	46	0	152	226	88	74
25	.....	440	1,400	700	83	35	0	98	118	88	68
26	.....	405	1,300	760	70	30	0	90	134	134	68
27	585	405	1,740	720	57	16	0	57	126	118	95
28	492	440	1,800	850	70	8	30	63	150	102	102
29	.....	422	1,880	870	185	76	0	51	134	110	95
30	.....	332	1,740	900	390	90	8	57	81	81	110
31	.....	320	.....	920	.....	120	8	.....	68	.....	118

NOTE.—Daily discharge determined from rating curves applicable as follows: Feb. 27 to May 15, well defined between 1,000 and 1,800 second-feet; May 16 to June 15, indirect method for shifting channels used; June 16 to Oct. 17, well defined below 400 second-feet; Oct. 18 to Dec. 31, well defined.

Monthly discharge of San Rafael River near Green River, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March	2,330	320	729	44,800	C.
April	1,880	310	748	44,500	B.
May	2,100	690	1,200	73,800	B.
June	900	57	307	18,300	C.
July	492	8	110	6,760	B.
August	390	0	44.3	2,720	B.
September	3,040	0	235	14,000	C.
October	2,250	46	222	13,600	C.
November	310	36	98.8	5,880	B.
December	150	68	101	6,210	B.
The period	.....	.....	.....	231,000	

COTTONWOOD CREEK NEAR ORANGEVILLE, UTAH.

This station, which is located at Johnson's ranch in the canyon about 5 miles northwest of Orangeville, Utah, and about 35 miles southwest of Price, the nearest railway point, was established May 1, 1909.

The station is below all important tributaries and above all diversions except Johnson's ditch, which takes out a small amount of water a short distance above the station.

Previous to August 22, 1909, the stage was recorded by measuring to the water surface from a reference point on a cottonwood tree 60 feet above the cable. A staff gage was installed August 22, 1909, at the same point, and all previous observations were corrected to the datum of this gage. During the flood of August 31 this gage was washed out. From September 1 to 17 the record was kept of the

water depth at the gage site. From September 20 observations were made of the distance to water surface from a mark on a rock at the site. All gage heights for 1909 have been reduced to the datum of the staff gage. On March 22, 1910, a slope gage was installed at a datum 0.8 foot lower than that used in 1909.

Discharge measurements at high stages are made from a cable 60 feet below the gage site. At low stages by wading at various sections above and below gage.

As the stream bed shifts, accurate determination of discharge is difficult. Heavy ice forms at this station during the winter months.

Discharge measurements of Cottonwood Creek near Orangeville, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 22	Fuller and Tanner	50	60	4.95	182
June 9[a]	E. S. Fuller	50	98	5.8	353
July 25	G. H. Canfield	24	30	4.69	43
25	do	22	36	4.69	47
Aug. 28	do	21	31	4.45	32
28	do	22	31	4.45	32
Sept. 29	do	21	27	3.61	30
Nov. 29	do	30	26	3.75	34

[a] Float measurement.

Daily gage height, in feet, of Cottonwood Creek near Orangeville, Utah, for 1910.

[Robert Johnson, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.7	.....	6.6	5.2	4.8	4.5	.....	3.6	3.7
2	4.7	6.0	6.6	5.1	4.7	4.5	.....	3.6	3.7
3	.....	6.2	6.5	.....	4.7	4.5	3.6	3.6	.....
4	4.8	6.0	6.4	.....	4.7	.....	3.6	3.6	.....
5	4.9	6.0	.....	5.1	4.6	4.6	3.6	3.6	3.8
6	4.7	6.1	6.1	5.1	4.6	4.4	3.6	.....	.....
7	4.7	6.4	6.0	5.0	.....	4.4	3.6	3.6	3.9
8	5.0	.....	5.9	5.0	4.6	4.4	3.6	.....	4.0
9	4.9	6.5	5.8	5.0	4.6	4.4	3.6	3.6	.....
10	.....	6.9	5.7	.....	4.6	4.4	3.6	3.7	3.8
11	5.1	7.5	5.6	4.9	4.7	.....	3.6.	3.7	.....
12	5.2	7.5	.....	4.9	4.7	4.4	3.6	3.7	.....
13	5.1	7.3	5.7	4.9	4.6	4.4	3.6	.....	3.4
14	.....	6.7	5.6	4.9	.....	.....	3.6	3.7	3.7
15	5.1	.....	5.6	4.9	4.6	5.6	3.6	3.7	3.8
16	5.0	6.1	5.6	4.9	4.6	7.9	3.6	3.7	.....
17	.....	6.1	5.5	.....	4.6	4.6	3.6	3.7	3.7
18	5.2	6.2	5.5	.....	4.5	.....	3.6	3.7	.....
19	5.5	6.4	.....	4.8	5.5	5.0	3.6	3.7	4.0
20	5.5	6.3	5.4	4.8	4.8	4.6	3.6	.....	.....
21	5.3	6.2	5.4	4.7	.....	3.6	3.6	3.7	3.9
22	5.6	.....	5.3	4.7	4.5	3.6	3.6	3.7	.....
23	5.7	6.2	5.3	4.7	4.5	3.6	.....	3.7	4.2
24	.....	6.2	5.3	.....	4.5	3.6	3.6	.....	4.5
25	6.0	6.2	5.3	.....	4.5	.....	3.6	3.7	.....
26	6.3	6.3	.....	.....	4.5	3.6	3.6	3.7	4.3
27	6.4	6.4	5.2	4.9	4.5	3.6	3.6	.....	.....
28	6.3	6.6	5.4	4.8	.....	3.6	3.6	3.7	4.4
29	6.3	.....	5.6	4.7	4.5	3.6	3.6	3.7	4.3
30	6.2	6.8	5.2	4.7	4.5	3.6	.....	3.7	.....
31	.....	6.7	.....	.....	4.5	.....	.....	.....	4.2

NOTE.—Gage heights Jan. 1 to Mar. 31 are not published, as they are very uncertain. During part of this period the observer recorded distances to water surface from a mark on a rock, and later recorded the depth of water at some point not indicated. The date on which he changed from one method to the other is not known.

A slope gage was installed Mar. 22 at a datum 0.8 foot lower than that used in 1909, but this gage was not read until Apr. 1.

Relation between gage height and discharge affected by ice during January, February, and December.

Daily discharge, in second-feet, of Cottonwood Creek near Orangeville, Utah, for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	120	500	650	175	60	35	25	25
2	120	470	650	150	50	35	25	25
3	130	530	610	150	50	35	25	25
4	140	460	560	140	50	40	25	25
5	165	460	500	140	40	50	25	25
6	120	490	450	140	40	30	25	25
7	120	600	420	120	40	30	25	25
8	190	620	385	120	40	30	25	25
9	160	640	355	120	40	30	25	25
10	180	800	320	105	40	30	25	35
11	210	1,030	290	90	50	30	25	35
12	235	1,030	305	90	50	30	25	35
13	210	940	320	90	40	30	25	35
14	210	700	290	90	40	30	25	35
15	210	590	290	90	40	270	25	35
16	180	480	290	90	40	1,140	25	35
17	200	480	260	80	40	70	25	35
18	230	510	260	70	30	110	25	35
19	315	580	250	70	210	150	25	35
20	315	540	235	70	70	80	25	35
21	260	500	235	55	50	5	25	35
22	345	500	210	55	35	8	25	35
23	380	500	210	55	35	10	25	35
24	430	500	210	60	35	10	25	35
25	480	500	210	65	35	12	25	35
26	580	540	195	70	35	15	25	35
27	620	570	180	75	35	20	25	35
28	580	650	235	60	35	30	25	35
29	580	690	290	45	35	30	25	35
30	540	730	180	45	35	30	25	35
31	.....	685	.....	50	35	.....	25	.....

NOTE.—Daily discharge determined by the indirect method for shifting channels, and also by applying the standard rating curve direct for short periods when it averages two or more measurements.

Monthly discharge of Cottonwood Creek near Orangeville, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	.....	.....	[a] 30.0	1,840	D.
February	.....	.....	[a] 30.0	1,670	D.
April	620	120	285	17,000	C.
May	1,030	460	607	37,300	C.
June	650	180	328	19,500	C.
July	175	45	91.1	5,600	C.
August	210	30	47.1	2,900	C.
September	1,140	5	81.8	4,870	C.
October	25	25	25.0	1,540	C.
November	35	25	32.0	1,900	C.
December	.....	.....	[a] 30.0	1,840	D.
The period	.....	.....	.....	96,000	

[a] Estimated.

FERRON CREEK NEAR FERRON, UTAH.

This station, which is located at Westingskow's ranch, about half a mile below the headgates of North and South canals, near the mouth of the canyon, about 2½ miles above the town of Ferron, Utah, and below all important tributaries, was established April 28, 1909.

The drainage area is 153 square miles.

Practically all the normal low-water flow is diverted above the station by the North and South canals, only enough water passing to supply one or two small ditches that take out below.

Several gages were used during 1909, all located in the same section. All gage heights were referred to one datum until August 31, when a flood destroyed the gage and bench mark and greatly changed the section. From September 1 to December 31 all gage heights refer to a new gage which was installed September 18, 1909, at a new datum.

Discharge measurements are made from a footbridge about 10 feet above the gage or by wading. Shifting of the stream bed makes it difficult to obtain accurate discharge records. The stream is icebound during the winter.

Discharge measurements of Ferron Creek near Ferron, Utah, for 1910.

Date.	Hydrographer	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	E. S. Fuller	19	24	2.40	91
21	do	38	28	2.40	90
June 8	do	38	28	1.95	48
July 24	G. H. Canfield	3	1.24	.80	[a] .47
Aug. 26	do	4.5	1.65	.70	[a] .22
Sept. 27	do	9.5	7.18	1.22	[a] 4.82
Nov. 29	do	3	1.3	.80	[a] .38

[a] Made by wading below the gage.

Daily gage height, in feet, of Ferron Creek near Ferron, Utah, for 1910.

[James Westingskow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.2	1.4	2.6	2.0	3.0	3.2	1.2	0.7	0.7	1.2	0.7	0.8
2	2.0	1.3	2.4	2.0	3.0	3.1	1.2	.7	.7	1.2	.6	.8
3	2.0	1.3	2.5	2.0	2.9	3.2	1.2	.7	2.0	1.2	.6	.8
4	2.0	1.3	2.2	2.0	2.8	3.2	1.2	.7	.7	1.2	.6	.8
5	2.0	1.3	2.3	2.0	2.8	3.2	1.2	.7	.7	1.2	.6	.8
6	2.0	1.4	2.2	2.0	2.8	3.0	1.2	.7	.7	1.2	.6	.8
7	2.0	1.5	2.2	2.0	2.6	2.6	1.2	.7	.7	.9	.6	.8
8	2.0	1.5	2.2	2.0	3.3	2.1	1.2	.7	.7	.9	.6	.8
9	2.0	1.5	2.2	2.0	3.3	1.8	1.2	.7	.7	.9	.6	.8
10	2.0	1.5	2.2	2.2	3.3	1.8	1.2	.7	.7	.9	.6	.8
11	2.0	1.5	2.0	2.2	3.2	1.6	1.2	1.9	.7	.9	.6	.8
12	2.0	1.6	2.0	2.4	3.2	1.6	1.2	.7	.7	.9	.6	.8
13	2.0	1.6	2.1	2.2	3.3	1.5	1.2	.7	.7	.9	.6	.8
14	2.0	1.6	2.1	2.2	3.4	1.4	1.2	.7	6.4	.9	.7	.8
15	2.0	1.8	2.2	2.4	3.1	1.4	3.0	.7	1.7	6.0	.7	.8
16	2.0	1.8	2.1	2.4	3.2	1.4	1.2	.7	2.7	1.2	.6	.8
17	1.0	1.8	2.1	2.6	3.3	1.3	1.0	.7	1.2	1.0	.6	.8
18	.5	1.6	2.5	2.8	3.2	1.3	.9	.7	6.7	.9	.6	.8
19	.5	1.4	3.0	3.3	3.0	1.3	.9	.7	1.2	.9	.6	.8
20	1.0	1.4	3.0	3.3	3.0	1.3	.9	.7	5.0	.8	.6	.8
21	1.2	1.4	3.0	3.3	2.9	1.3	.9	.7	1.2	.8	.6	1.0
22	1.4	1.4	3.2	3.4	2.9	1.2	.9	.7	1.3	.8	.7	1.2
23	1.5	1.5	2.4	3.4	2.7	1.2	.8	.7	1.3	.8	.7	1.2
24	1.5	1.5	2.0	3.4	2.7	1.2	.8	.7	1.3	.8	.8	1.1
25	1.6	1.5	2.0	3.6	2.9	1.2	.8	.7	1.3	.8	.8	1.0
26	1.5	1.5	2.0	3.7	3.0	1.2	.8	.7	1.3	.8	.8	1.0
27	1.5	1.8	2.0	4.2	3.0	1.2	.9	.7	1.2	.8	.8	1.0
28	1.5	2.0	1.8	4.0	2.9	1.2	.8	.7	1.2	.8	.8	1.0
29	1.6	.....	1.6	3.5	3.2	1.2	1.7	.7	1.2	.8	.8	1.0
30	1.5	.....	1.6	3.3	3.3	1.2	.8	.7	1.2	.8	.8	1.0
31	1.4	.....	2.0	.....	3.3	.....	.7	.7	.....	.7	.....	1.0

NOTE.—Gage heights Jan. 1 to 16 and Dec. 21 to 31 affected by presence of ice.

Daily discharge, in second-feet, of Ferron Creek, near Ferron, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.5	10	110	51	150	170	4.0	0.2	0.2	4.0	0.2	0.4
2	1.5	6.5	90	51	150	160	4.0	.2	.2	4.0	.1	.4
3	1.5	6.5	100	51	140	170	4.0	.2	51	4.0	.1	.4
4	1.5	6.5	70	51	130	170	4.0	.2	.2	4.0	.1	.4
5	1.5	6.5	80	51	130	170	4.0	.2	.2	4.0	.1	.4
6	1.5	10	70	51	130	150	4.0	.2	.2	4.0	.1	.4
7	1.5	14	70	51	110	110	4.0	.2	.2	.9	.1	.4
8	1.5	14	70	51	180	60	4.0	.2	.2	.9	.1	.4
9	1.5	14	70	51	180	34	4.0	.2	.2	.9	.1	.4
10	1.5	14	70	70	180	34	4.0	.2	.2	.9	.1	.4
11	1.5	14	51	70	170	19	4.0	42	.2	.9	.1	.4
12	1.5	19	51	90	170	19	4.0	.2	.2	.9	.1	.4
13	1.5	19	60	70	180	14	4.0	.2	.2	.9	.1	.4
14	1.5	19	60	70	190	10	4.0	.2	490	.9	.2	.4
15	1.5	34	70	90	160	10	150	.2	26	450	.2	.4
16	1.5	34	60	90	170	10	4.0	.2	120	4.0	.1	.4
17	1.5	34	60	110	180	6.5	1.5	.2	4.0	1.5	.1	.4
18	0	19	100	130	170	6.5	.9	.2	520	.9	.1	.4
19	0	10	150	180	150	6.5	.9	.2	4.0	.9	.1	.4
20	1.5	10	150	180	150	6.5	.9	.2	350	.4	.1	.4
21	4.0	10	150	180	140	6.5	.9	.2	4.0	.4	.1	.4
22	10	10	170	190	140	4.0	.9	.2	6.5	.4	.2	.4
23	14	14	90	190	120	4.0	.4	.2	6.5	.4	.2	.4
24	14	14	51	190	120	4.0	.4	.2	6.5	.4	.4	.4
25	19	14	51	210	140	4.0	.4	.2	6.5	.4	.4	.4
26	14	14	51	220	150	4.0	.4	.2	6.5	.4	.4	.4
27	14	34	51	270	150	4.0	.9	.2	4.0	.4	.4	.4
28	14	51	34	250	140	4.0	.4	.2	4.0	.4	.4	.4
29	19	.....	19	200	170	4.0	26	.2	4.0	.4	.4	.4
30	14	.....	19	180	180	4.0	.4	.2	4.0	.4	.4	.4
31	10	.....	51	.....	180	.....	.2	.2	.....	0	.....	.4

NOTE.—Daily discharge Jan. 1 to 16 and Dec. 21 to 31, estimated because of presence of ice. Discharge Jan. 17 to Dec. 20 determined from a discharge rating curve well defined below 150 second-feet.

Monthly discharge of Ferron Creek near Ferron, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	19	0	5.58	343	C.
February	51	6.5	17.0	944	C.
March	170	19	75.8	4,660	B.
April	270	51	123	7,320	C.
May	190	110	155	9,530	C.
June	170	4.0	46.0	2,740	B.
July	150	.2	7.91	486	B.
August	42	.2	1.55	95	B.
September	520	.2	54.0	3,210	C.
October	450	.2	15.9	978	C.
November	.4	.1	.19	11	C.
December	.4	.4	.4	25	C.
The year	520	.1	41.90	30,300	

HUNTINGTON CREEK NEAR HUNTINGTON, UTAH.

This station, which is located at Cunha's ranch, in the canyon about 7 miles northwest of Huntington, Utah, was established May 3, 1909.

The ditch for the Cunha ranch diverts a small amount of water a short distance above the station; practically all the normal low-water flow is diverted for irrigation by canals heading near Huntington. This station is located below all principal tributaries and above

all the main diversions. A storage reservoir above the station controls the distribution of the flow to a considerable extent.

The vertical staff gage is in two sections. The low-water part is nailed to an old bridge abutment on the right bank about 3 feet from the cable; the high-water section is nailed to the west face of a cottonwood tree near the low-water section. The gage datum has remained unchanged since the station was established.

Discharge measurements are made from a cable.

The relation between gage height and discharge at this station is not seriously affected by ice. The shifting of the stream bed during the spring high water and summer floods impairs the reliability of the records.

Discharge measurements of Huntington Creek near Huntington, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 23	Fuller and Tanner	32	43	3.15	154
June 8	E. S. Fuller	37	71	3.75	231
July 26	G. H. Canfield	34	51	3.18	94
27	.....do	34	53	3.20	101
Aug. 29	.....do	32	35	2.76	41
29	.....do	32	32	2.76	41
Sept. 30	.....do	30	29	2.75	42
Nov. 30	.....do	30	22	2.63	31

Daily gage height, in feet, of Huntington Creek near Huntington, Utah, for 1910.

[Joseph Cunha, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.6	.....	.....	5.3	3.75	.....	.....	2.7	2.8	2.65	.....
2	.....	.....	2.4	.....	5.15	3.65	.....	.....	2.7	2.9	2.65	.....
3	.....	2.6	.....	3.2	5.55	3.75	.....	.....	2.8	2.8	2.65	.....
4	.....	.....	2.5	.....	5.7	3.65	.....	.....	2.8	2.7	2.65	.....
5	.....	2.5	.....	3.1	5.9	3.7	.....	.....	2.75	2.7	2.65	2.6
6	2.5	.....	2.4	.....	5.8	3.65	.....	.....	2.7	2.75	2.65	2.6
7	.....	2.6	.....	2.9	5.85	3.7	.....	.....	2.8	2.75	2.65	2.6
8	2.6	.....	2.5	.....	.....	3.65	.....	.....	2.8	2.75	2.65	.....
9	.....	2.5	.....	.....	5.65	3.65	.....	.....	2.75	2.75	2.65	.....
10	2.5	.....	2.5	3.0	5.3	3.55	.....	.....	2.8	2.75	2.65	.....
11	.....	2.4	.....	.....	5.45	3.55	.....	.....	2.75	2.7	2.65	.....
12	.....	2.6	2.5	3.5	5.65	3.45	.....	.....	2.85	2.7	2.65	2.6
13	2.4	.....	.....	3.8	5.8	3.45	.....	.....	2.9	2.7	2.65	2.65
14	.....	2.7	2.5	3.6	5.75	3.45	.....	.....	2.9	2.7	2.65	2.7
15	.....	2.7	.....	4.0	5.55	3.55	.....	2.6	3.2	2.7	2.65	.....
16	2.5	.....	2.4	4.0	5.45	3.65	.....	2.6	3.2	2.7	2.65	.....
17	.....	2.8	.....	3.9	5.1	3.65	.....	2.65	3.25	2.7	2.65	.....
18	2.6	2.7	.....	3.7	5.1	3.65	.....	2.65	3.2	2.7	2.65	.....
19	.....	2.7	.....	4.0	4.75	3.55	.....	2.6	3.0	2.7	2.65	.....
20	.....	.....	3.2	4.1	4.65	3.45	.....	2.65	2.9	2.7	2.65	.....
21	2.6	2.6	.....	4.2	4.65	3.45	.....	2.65	2.8	2.7	2.65	2.65
22	.....	.....	3.0	4.1	4.0	3.35	.....	2.7	2.85	2.7	2.65	2.65
23	.....	2.5	.....	.....	3.75	3.25	.....	2.65	2.85	2.7	2.65	2.65
24	2.6	.....	3.1	4.3	3.75	.....	.....	2.7	2.8	2.7	2.65	.....
25	.....	2.4	.....	4.4	3.7	.....	.....	2.65	2.85	2.7	2.65	.....
26	2.5	.....	2.9	4.6	3.7	.....	3.2	2.7	2.8	2.7	2.65	.....
27	.....	2.5	.....	4.8	3.75	.....	.....	2.6	2.9	2.7	2.65	.....
28	2.6	.....	.....	4.7	3.75	.....	.....	2.7	2.85	2.7	2.65	2.65
29	.....	.....	3.1	4.3	3.7	.....	.....	2.7	2.8	2.7	2.65	.....
30	2.5	.....	.....	4.9	3.65	.....	.....	2.8	2.8	2.7	2.65	.....
31	.....	.....	3.2	.....	3.7	.....	.....	2.8	.....	2.7	.....	.....

Daily discharge, in second-feet, of Huntington Creek near Huntington, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	45	56	33	165	830	232	.....	29	38	47	34	34
2	45	56	26	165	780	204	.....	29	38	58	34	34
3	45	56	33	165	925	232	.....	29	47	47	34	29
4	45	48	40	155	990	204	.....	29	47	38	34	29
5	45	40	33	145	1,070	217	.....	29	42	38	34	29
6	40	48	26	126	1,030	204	.....	29	38	42	34	29
7	48	56	33	107	1,050	217	.....	29	47	42	34	29
8	56	48	40	113	1,000	204	.....	29	47	42	34	29
9	48	40	40	119	960	204	.....	29	42	42	34	29
10	40	33	40	125	810	178	.....	29	47	42	34	29
11	35	26	40	180	870	178	.....	29	42	38	34	29
12	31	56	40	235	955	154	.....	29	52	38	34	29
13	26	64	40	320	1,000	154	.....	29	58	38	34	34
14	31	73	40	261	980	154	.....	29	58	38	34	38
15	35	73	33	385	900	178	.....	29	102	38	34	38
16	40	82	26	385	840	204	.....	29	102	38	34	38
17	48	90	61	350	700	204	.....	34	112	38	34	36
18	56	73	96	285	700	204	.....	34	102	38	34	36
19	56	73	130	375	560	178	.....	29	72	38	34	34
20	56	64	165	410	520	154	.....	34	58	38	34	34
21	56	56	145	440	520	154	.....	34	47	38	34	34
22	56	48	125	410	307	132	.....	38	52	38	34	34
23	56	40	135	435	232	112	.....	34	52	38	34	34
24	56	33	145	470	232	112	.....	38	47	38	34	34
25	48	26	126	500	217	102	.....	34	52	38	34	34
26	40	33	107	570	217	102	102	38	47	38	34	34
27	48	40	120	650	232	94	.....	29	58	38	34	34
28	56	33	132	610	232	94	.....	38	52	38	34	34
29	48	.....	145	455	217	87	.....	38	47	38	34	34
30	40	.....	155	680	204	87	.....	47	47	38	34	34
31	48	.....	165	.....	217	.....	.....	47	.....	38	.....	34

NOTE.—Daily discharge determined from curves applicable as follows: Jan. 1 to Apr. 16, poorly defined; Apr. 17 to May 21, indirect method for shifting channels used; May 22 to Dec. 31, rating curve well defined below 20 second-feet. Discharge estimated Aug. 1 to 14. Discharge interpolated for days of missing gage heights.

Ice not reported in 1910, but may have existed in January and February, and the use of the open-water rating curve for these months may have caused considerable errors. Ice reported at times of last two measurements in 1909.

Monthly discharge of Huntington Creek near Huntington, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	56	26	45.9	2,820	D.
February	90	26	52.3	2,900	D.
March	165	26	81.1	4,990	C.
April	680	107	326	19,400	C.
May	1,070	204	655	40,300	C.
June	232	87	164	9,760	C.
August	47	29	32.6	2,000	C.
September	112	38	56.4	3,360	B.
October	58	38	39.9	2,450	B.
November	34	34	34.0	2,020	B.
December	38	29	32.9	2,020	C.
The period	.....	.....	.....	92,000	

GRAND RIVER BASIN.

GENERAL FEATURES.

Grand River and its tributaries drain an area comprising approximately 26,000 square miles, of which 22,300 is in Colorado and the rest in eastern Utah. On the east and southeast the basin is bounded by the high ranges of the Continental Divide, which separate it from the basins of Platte and Arkansas rivers; on the north it is limited by the White River and Book Cliffs Plateau, on the west by the canyon district of the Colorado.

Rising among the high peaks of the Rocky Mountains in the north-central portion of Colorado, the Grand flows southwestward to its junction with Green River, traversing approximately 350 miles. Its tributaries include Fraser, Blue, Eagle, Williams, and Roaring forks and Gunnison and Dolores rivers, all of which enter from the south.

In most respects the Grand is a typical mountain stream, flowing throughout its course in a succession of deep canyons, whose precipitous or even perpendicular walls range in height up to 3,000 feet above the water's edge, alternating with long, narrow fertile valleys. The headwater region, comprising approximately 50 per cent of the basin, is extremely rugged, elevations ranging from 7,000 to 14,000 feet above sea level. Stream channels are numerous, tributaries are rapid, and gradients are steep, the fall ranging from 20 to 150 feet to the mile. The intermediate or middle portion of the basin—that portion immediately east and west of the Colorado State line—is a dry, broken, much eroded region.

The precipitation ranges from 5 to 10 inches in the lower basin, 10 to 20 inches in the intermediate region, and 20 to 30 inches in the headwater region. By far the greater part of the precipitation is in the form of snow.

The greater part of the timbered area in the Grand River basin above the Gunnison is included in the Arapahoe and Holy Cross national forests. These reserves in the Grand drainage basin include about 1,400 square miles of merchantable timberland, 900 square miles of woodland, and about 800 square miles of burned area.

In the middle basin, from the lower end of Gore Canyon to about Rifle, 30,000 to 35,000 acres will be irrigated under half a dozen small projects now contemplated. In the lower basin the Reclamation Service has underway the Grand Valley project, to cover an irrigable area of 60,000 to 70,000 acres. Under other schemes, 40,000 to 50,000 acres more will be irrigated. The Uncompahgre Valley project, which diverts water from the Gunnison, has finished structures capable of irrigating about 50,000 acres. The completed project will serve about 150,000 acres.

Natural storage within the basin is restricted to a few high mountain lakes, of which Grand Lake is the largest. There are, however, reservoir sites along the Grand and its tributaries which, if utilized, would make possible a development of 1,000,000 horsepower. The Kremmling reservoir site is by far the best in the drainage basin. It is located near the upper end of Gore Canyon and with a 230-foot dam would impound about 2,200,000 acre-feet of water. A standard-gage railroad now runs through this site.

Until recently the splendid power resources of this drainage basin have remained practically untouched. The estimated available power, including that on Dolores and Gunnison rivers, is as follows:

Minimum horsepower	540,000
Minimum horsepower, six high months	1,000,000
Horsepower from storage, six months' period	1,600,000

Of this amount less than 40,000 horsepower has so far been developed.

Hot sulphur springs are located along Grand River at two points, Hot Sulphur Springs and Glenwood Springs, Colo., and in both localities they increase the temperature of the river water, but probably all these springs together add less than 20 second-feet to the flow of the river.

Since 1899 the year of maximum run-off in this basin was 1909. The year of minimum run-off was 1902.

NORTH FORK OF GRAND RIVER NEAR GRAND LAKE, COLO.

This station, which is located at the highway bridge on the road between Grand Lake and Granby, about 12 miles from Granby station, on the Denver, Northwestern & Pacific Railway, about 3 miles southwest of Grand Lake post office, Colo., and about 2 miles above Grand Lake outlet, the most important tributary of this fork of the Grand, was established July 29, 1904, discontinued September 30, 1909, and reestablished September 21, 1910. The drainage area at this point comprises about 125 square miles.

One large ditch above the station diverts water into the headwaters of the Cache la Poudre, in the South Platte basin.

A staff gage is attached to the bridge. Its datum has remained unchanged during the maintenance of the station.

Winter records at this station are more satisfactory than at the other stations on the headwaters of the Grand, as near-by springs, tend to keep the stream at the gaging section more or less open.

Fairly good results have been obtained at this station, though low-stage measurements, because of sluggish current, are not entirely satisfactory.

Discharge measurements of North Fork of Grand River near Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	R. H. Bolster	39	86	4.05	116
4	W. B. Freeman	49	47	4.05	99
Sept. 8	S. T. Harding	38	67	3.80	57
21	....do	40	75	4.07	94

NOTE.—The following gage heights were also observed: Sept. 27, 3.8; Oct. 13, 3.6; Nov. 7, 3.5; Dec. 18, 3.55; Dec. 19, 3.6.

GRAND RIVER NEAR GRANBY, COLO.

This station, which is located at a highway bridge that crosses the river about 4 miles from Granby on the road to Grand Lake, was established June 10, 1908. During 1910 it was maintained in cooperation with the State engineer of Colorado.

The station is about 4 miles below the junction of North and South forks, about the same distance above the mouth of Fraser River, and is above the mouth of Willow Creek. The drainage area is 484 square miles.

No important diversions are made on the South Fork or on the main stream above the station. Several filings for power development have been made above this station, but additional opportunities for filing no doubt exist. A small power plant is located on a tributary of the South Fork.

Measurements of discharge are made from a cable 300 feet downstream from the bridge.

Thick ice covers the river for about four months each year and anchor ice also occurs.

The location and datum of the gage have remained unchanged during the maintenance of the station.

Discharge measurements of Grand River near Granby, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 22	H. A. Howe	24	19	3.10	[a]33
Mar. 11	....do	25	26	3.20	[a]57
May 7	....do	100	176	2.60	448
June 4	....do	109	349	4.20	1,870
July 5	Bolster and Freeman	100	197	2.77	557
30	C. L. Chatfield	99	157	2.40	333
Sept. 19	....do	96	140	2.16	241

[a] Measurement made through holes cut in ice.

Daily gage height, in feet, of Grand River near Granby, Colo., for 1910.

[J. P. Switzer, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.85	3.0	4.5	2.9	2.3	1.65	1.9	1.6	1.5
2	1.9	3.0	4.45	2.9	2.3	1.75	1.8	1.6	1.5
3	1.9	2.85	4.25	2.9	2.2	1.9	1.8	1.6	1.5
4	1.85	2.75	4.15	2.8	2.2	1.95	1.8	1.5	1.55
5	1.85	2.7	3.85	2.7	2.15	2.05	1.8	1.5	1.55
6	1.9	2.85	3.7	2.65	2.1	2.05	1.7	1.5	1.6
7	1.95	3.05	3.75	2.6	2.1	2.0	1.7	1.5	1.6
8	2.0	3.1	3.55	2.5	2.0	2.0	1.7	1.5	1.6
9	2.1	3.25	3.5	2.5	2.0	1.9	1.7	1.5	1.6
10	2.2	3.35	3.4	2.4	1.95	1.9	1.7	1.6	1.6
11	2.2	3.45	3.45	2.4	1.9	1.9	1.7	1.6	1.55
12	2.2	3.5	3.55	2.3	1.9	2.0	1.7	1.6	1.6
13	2.2	3.45	3.5	2.3	1.9	2.0	1.7	1.6	1.55
14	2.2	3.35	3.5	2.2	1.9	2.1	1.7	1.5	1.6
15	2.2	3.2	3.5	2.2	1.9	2.1	1.7	1.5	1.6
16	2.2	3.3	3.5	2.2	1.9	2.1	1.7	1.5	1.65
17	2.15	3.15	3.5	2.2	1.9	2.0	1.7	1.5	1.55
18	2.2	3.0	3.35	2.1	1.9	2.0	1.7	1.5	1.65
19	2.3	2.9	3.3	2.1	1.9	2.0	1.7	1.5	1.85
20	2.25	2.95	3.3	2.0	1.9	2.0	1.7	1.5	2.0
21	2.1	3.0	3.15	2.0	1.85	2.1	1.7	1.5	2.0
22	2.25	3.1	3.1	2.1	1.8	2.1	1.7	1.5	2.0
23	2.3	3.0	3.1	2.0	1.8	2.1	1.7	1.5	2.0
24	2.4	3.2	3.0	1.9	1.7	2.1	1.7	1.5	2.0
25	2.85	3.1	3.0	1.9	1.7	2.05	1.7	1.5	2.0
26	2.65	3.35	3.0	1.9	1.7	1.95	1.7	1.5	2.05
27	2.85	3.65	3.0	1.9	1.6	1.95	1.7	1.5	2.05
28	3.0	3.5	3.1	1.9	1.6	1.95	1.7	1.5	2.0
29	3.0	3.9	3.1	2.1	1.6	1.9	1.7	1.5	2.0
30	3.1	4.05	3.0	2.4	1.6	1.9	1.7	1.5	2.0
31	.....	4.35	.....	2.25	1.6	.....	1.7	.....	2.0

NOTE.—River frozen over Jan. 1 to Mar. 31. Gage heights taken through hole cut in ice.

Daily discharge, in second-feet, of Grand River near Granby, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	168	695	2,320	630	315	119	182	108	.....
2	182	695	2,240	630	315	142	155	108	.....
3	182	598	1,940	630	277	182	155	108	.....
4	168	535	1,800	565	277	196	155	88	.....
5	168	505	1,450	505	260	226	155	88	.....
6	182	598	1,300	478	242	226	130	88	.....
7	196	730	1,350	450	242	210	130	88	.....
8	210	765	1,150	400	210	210	130	88	.....
9	242	880	1,100	400	210	182	130	88	.....
10	277	962	1,000	355	196	182	130	108	.....
11	277	1,050	1,050	355	182	182	130	108	.....
12	277	1,100	1,150	315	182	210	130	108	.....
13	277	1,050	1,100	315	182	210	130	108	.....
14	277	962	1,100	277	182	242	130	88	.....
15	277	840	1,100	277	182	242	130	88	.....
16	277	920	1,100	277	182	242	130	88	.....
17	260	802	1,100	277	182	210	130	88	.....
18	277	695	962	242	182	210	130	88	.....
19	315	630	920	242	182	210	130	88	.....
20	296	662	920	210	182	210	130	88	.....
21	242	695	802	210	168	242	130	88	.....
22	296	765	765	242	155	242	130	88	.....
23	315	695	765	210	155	242	130	88	.....
24	355	840	695	182	130	242	130	88	.....
25	598	765	695	182	130	226	130	88	.....
26	478	962	695	182	130	196	130	88	.....
27	598	1,240	695	182	108	196	130	88	.....
28	695	1,100	765	182	108	196	130	88	.....
29	695	1,500	765	242	108	182	130	88	.....
30	765	1,680	695	355	108	182	130	88	.....
31	.....	2,080	.....	296	108	.....	130	.....	.....

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined throughout.

Monthly discharge of Grand River near Granby, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	765	168	327	19,500	B.
May	2,080	505	903	55,500	A.
June	2,320	695	1,120	66,600	A.
July	630	182	332	20,400	A.
August	315	108	186	11,400	A.
September	242	119	206	12,300	A.
October	182	130	135	8,300	B.
November	108	88	92.7	5,520	B.
December	.....	.....	[a] 75.0	4,610	D.
The period	.....	.....	.....	204,000	

[a] Estimated.

GRAND RIVER AT SULPHUR SPRINGS, COLO.

This station, which was originally located at the highway bridge one-eighth mile below Sulphur Springs and later removed to the new highway bridge about 1,000 feet above the old site, was established July 27, 1904, discontinued September 30, 1909, and reestablished September 23, 1910, in cooperation with the State engineer of Colorado and the United States Forest Service.

Grand River is joined by Fraser River about 10 miles above Sulphur Springs and by Williams Fork a few miles below.

A standard chain gage installed near the station was moved to the new bridge April 17, 1906, and has been used at the same location and datum since the reestablishment of the station. The chain gage bears no determined relation to the original gage.

A number of small private ditches divert water for meadow irrigation along the tributaries above the station and along the Grand.

The river freezes across for about four months each year, the ice sometimes reaching a depth of 2 feet during the winter months, and temporary gages have been maintained in the canyon one-quarter mile below the station, where the river is open and where measurements can be made by wading.

Discharge measurements of Grand River at Sulphur Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 2	Freeman and Bolster	118	258	3.09	904
29	C. L. Chatfield	111	185	2.44	474
Sept. 17	.....do	104	142	2.10	288
Oct. 8	.....do	.....	124	1.80	208

Daily gage height, in feet, and discharge, in second-feet, of Grand River at Sulphur Springs, Colo., for 1910.

Day.	September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.9	220	1.7	170
2				220	1.7	170
3			1.9	220	1.65	160
4			1.9	220	1.65	160
5			1.9	220	1.65	160
6			1.9	220	1.6	150
7			1.8	193	1.65	160
8			1.8	193	1.65	160
9				190		160
10				180		160
11			1.7	170	1.65	160
12				170	1.65	160
13				170		
14				170		
15			1.7	170		
16				175		
17	2.1	288		180		
18		305		185		
19		320		190		
20		338		195		
21		355		200		
22		372		210		
23	2.3	388	1.9	220		
24	2.2	336	1.9	220		
25	2.05	269	1.85	206		
26	2.1	288	1.85	206		
27	2.05	269		200		
28	2.05	269		195		
29	2.0	250		190		
30	1.95	235		185		
31				180		

NOTE.—Daily discharge Sept. 17 to Nov. 30 determined from a rating table well defined above 200 second-feet; discharge interpolated for days of missing gage heights.

Monthly discharge of Grand River at Sulphur Springs, Colo., for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).	Accuracy.
September 17–30	306	8,500	C.
October	196	12,100	C.
November 1–12	161	3,830	C.

GRAND RIVER NEAR KREMMLING, COLO.

This station, which is located at the upper end of Gore Canyon, about 3 miles west of Kremmling, near the Kremmling reservoir dam site and about 2 miles below the mouth of Blue River, was established July 24, 1904, and is maintained in cooperation with the State engineer of Colorado.

Between this station and the station at Sulphur Springs, Williams Fork and Troublesome and Muddy rivers enter the Grand, and a number of private ditches divert water for meadow irrigation for both the main stream and its tributaries.

On October 18, 1906, a slope gage was established on the opposite side of the river from the old chain gage. The zero of the slope gage is about 0.70 feet above the chain gage zero. On July 28, 1910, a Friez automatic gage was installed by the State engineer, presumably at the same datum and at practically the same location as the slope gage.

Discharge measurements are made from a cable a few feet downstream from the gage.

The river is frozen completely across at the station for about four months each year; anchor ice also forms in the riffles just below the gage.

The channel is scoured out during high stages and silt is deposited at low stages. High and medium stage data are good but low-stage data are not so accurate.

Discharge measurements of Grand River near Kremmling, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 8	H. A. Howe	100	165	0.8	[a]363
27	do	100	161	1.40	[a]361
Mar. 17	do	110	795	3.40	1,120
May 3	do	127	1,330	7.05	2,840
12	do	135	1,820	10.05	5,330
July 1	W. B. Freeman	123	1,410	6.30	2,400
28	C. L. Chatfield	112	746	2.25	737
Sept. 16	do	107	407	2.28	744
Oct. 11	do	104	224	1.42	494
Nov. 20	do	103	165	1.08	329

[a] Measurement made through ice.

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1910.

[H. C. Rogers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	2.25	1.05	1.15	2.65	8.15	12.25	6.3	4.3	1.4	1.7	1.35
2	2.2	1.05	1.2	2.75	7.7	11.9	5.7	4.1	1.35	1.65	1.35
3	1.95	1.05	1.5	2.9	7.05	12.35	5.15	3.75	1.35	1.65	1.4
4	1.9	1.0	1.55	2.55	6.65	12.1	4.95	3.5	1.6	1.6	1.35
5	1.75	.9	1.85	2.5	6.85	11.3	5.15	3.4	3.0	1.6	1.35
6	1.75	.8	2.6	2.55	6.85	10.6	5.2	3.5	2.9	1.55	1.35
7	1.75	.8	2.85	2.55	6.55	10.45	4.7	3.2	2.6	1.5	1.25
8	1.45	.8	3.15	2.75	6.35	10.1	4.2	2.85	2.3	1.5	1.25
9	1.35	.8	3.15	3.05	6.95	9.45	3.9	2.7	2.1	1.5	1.2
10	1.25	.8	2.5	3.5	8.25	8.85	3.6	2.55	1.9	1.45	1.2
11	1.25	.8	2.2	3.85	9.1	8.7	3.5	2.4	1.75	1.4	1.2
12	1.25	.95	2.2	4.05	9.8	8.7	3.35	2.35	1.8	1.4	1.2
13	1.25	1.0	2.6	4.3	9.45	8.75	3.2	2.45	2.0	1.35	1.2
14	1.15	1.0	2.75	4.45	9.15	8.65	3.15	2.4	2.2	1.35	1.15
15	1.2	1.1	2.9	4.0	8.9	8.4	2.95	2.3	2.4	1.3	1.15
16	1.2	1.1	3.05	3.4	8.35	8.25	2.95	2.2	2.3	1.35	1.2
17	1.2	1.0	3.2	3.65	7.65	8.15	3.1	2.1	2.3	1.4	1.2
18	1.2	.9	3.4	3.4	7.75	7.4	3.25	2.05	2.3	1.6	1.2
19	1.2	1.0	3.45	3.75	7.2	7.15	3.4	2.9	2.5	1.7	1.1
20	1.15	1.0	3.55	4.35	7.1	7.15	3.35	1.9	2.85	1.75	1.1
21	1.1	1.0	3.7	5.4	7.35	6.95	3.15	1.9	2.75	1.6	1.1
22	1.2	1.1	4.05	5.25	7.25	6.6	3.1	1.85	2.9	1.45	1.1
23	1.2	1.2	4.4	5.1	7.15	6.4	2.95	1.8	2.65	1.45	1.1
24	1.2	1.2	4.05	5.2	7.0	6.2	2.75	1.8	2.45	1.45	1.15
25	1.2	1.25	3.85	5.8	7.1	5.95	2.65	1.75	2.2	1.5	1.15

Daily gage height, in feet, of Grand River near Kremmling, Colo., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
26	1.05	1.3	3.45	6.6	7.6	5.55	2.4	1.65	2.05	1.55	1.1
27	1.0	1.2	3.1	7.35	7.55	5.6	2.2	1.55	2.0	1.55	1.05
28	1.05	1.1	3.05	8.05	8.3	5.6	2.55	1.55	1.9	1.45	0.95
29	1.1	.....	3.05	8.65	10.2	5.5	3.95	1.55	1.85	1.35	.95
30	1.1	.....	2.25	8.75	11.4	6.2	5.25	1.55	1.75	1.35	1.0
31	1.1	.....	2.65	.....	12.0	.....	5.1	1.45	.....	1.3	.....

NOTE.—Relation between gage heights and discharge affected by ice Jan. 1 to Mar. 5. Gage heights for first 10 days of December very uncertain; not published; river frozen over Dec. 11–31.

Daily discharge, in second-feet, of Grand River near Kremmling, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	360	845	3,510	7,600	2,420	1,440	490	565	478
2	360	875	3,280	7,160	2,090	1,360	478	552	478
3	360	925	2,860	7,720	1,820	1,220	478	552	490
4	360	815	2,620	7,400	1,730	1,140	540	540	478
5	360	800	2,740	6,460	1,820	1,100	960	540	478
6	830	815	2,740	5,690	1,840	1,140	925	528	478
7	908	815	2,560	5,540	1,620	1,030	830	515	452
8	1,010	875	2,440	5,190	1,400	908	740	515	452
9	1,010	978	2,800	4,600	1,280	860	680	515	440
10	800	1,140	3,650	4,100	1,170	815	620	502	440
11	710	1,260	4,300	3,980	1,140	770	558	490	440
12	710	1,340	4,910	3,980	1,080	758	590	490	440
13	830	1,440	4,600	4,020	1,030	785	650	478	440
14	875	1,500	4,340	3,950	1,010	770	710	478	428
15	925	1,320	4,140	3,760	942	740	770	465	428
16	978	1,100	3,720	3,650	942	710	740	478	440
17	1,030	1,190	3,250	3,580	995	680	740	490	440
18	1,100	1,100	3,310	3,080	1,048	665	740	540	440
19	1,120	1,220	2,960	2,920	1,100	650	800	565	415
20	1,150	1,460	2,890	2,920	1,080	620	908	578	415
21	1,200	1,940	3,050	2,800	1,010	620	875	540	415
22	1,340	1,860	2,990	2,580	995	605	925	502	415
23	1,480	1,800	2,920	2,470	942	590	845	502	415
24	1,340	1,840	2,820	2,360	875	590	785	502	428
25	1,260	2,140	2,890	2,220	845	578	710	515	428
26	1,120	2,580	3,220	2,020	770	552	665	528	415
27	995	3,050	3,180	2,040	710	528	650	528	402
28	978	3,510	3,680	2,040	815	528	620	502	377
29	978	3,950	5,280	1,990	1,300	528	605	478	377
30	725	4,020	6,570	2,300	1,860	528	558	478	390
31	845	.....	7,280	.....	1,800	502	.....	465	.....

NOTE.—Daily discharge Mar. 1 to 5 estimated; discharge Mar. 6 to Nov. 30 determined from a well-defined curve.

Monthly discharge of Grand River near Kremmling, Colo., for 1910.

[Drainage area, 2,380 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
February	.....	.....	[a]360	0.151	0.16	20,000	C.
March	1,480	.....	905	.380	.44	55,600	B.
April	4,020	800	1,620	.681	.76	96,400	A.
May	7,280	2,440	3,600	1.51	1.74	221,000	A.
June	7,600	1,990	4,010	1.69	1.89	239,000	B.
July	2,420	710	1,270	.534	.62	78,100	A.
August	1,440	502	784	.329	.38	48,200	A.
September	960	478	706	.297	.33	42,000	A.
October	578	465	513	.216	.25	31,500	A.
November	490	377	435	.183	.20	25,900	B.
The period	.....	.....	.....	.....	.....	858,000	

[a] Estimated on basis of 2 discharge measurements made during February.

GRAND RIVER AT GLENWOOD SPRINGS, COLO.

This station, which is located at Glenwood Springs, about one-fourth mile above the mouth of Roaring Fork, was established May 12, 1899, discontinued July 17, 1899, and reestablished January 7, 1900. It is now maintained in cooperation with the State engineer of Colorado and the Central Colorado Power Co.

The original gage, of the float type, was located at the plant of the Glenwood Light & Power Co. about one-fourth mile above the State bridge, and was replaced May 10, 1910, by a Friez automatic gage installed at the same location and datum.

Discharge measurements are made from a cable underneath the State bridge.

A few minor irrigation ditches divert water from the river between this station and the station at Kremmling. The Shoshone plant of the Central Colorado Power Co., utilizing a head of 170 feet, was practically completed in 1908. The tail water from this plant is returned to the river above the gaging station. During 1907 and 1908 the débris from the Shoshone plant was deposited in the river bed and the discharge rating curve of the stream was thereby changed. Except during this period the channel has been permanent.

Even in the most severe weather hot water from the near-by springs keeps the water in the river above the freezing point. The winter records are, therefore, of special value as they furnish a basis for estimating approximately the discharge of the streams at other stations in the basin during that period.

Results of observations at this station were trustworthy prior to the latter half of 1910, when the new automatic gage gave unsatisfactory results.

Discharge measurements of Grand River at Glenwood Springs, Colo., for 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 17	W. B. Freeman	192	659	4.16	1,590
Apr. 26	....do	215	1,120	6.22	5,150
26	....do	215	1,140	6.20	5,260
May 17	Freeman and Matthes	218	1,330	6.75	6,320
June 11	Bolster and Lyon	215	1,280	7.17	7,280
July 8	G. H. Russell	202	812	5.73	2,500
Aug. 13	G. J. Lyon	186	628	5.53	1,520
Sept. 6	G. H. Russell	193	720	5.72	1,950
21	....do	186	694	5.73	1,850
Nov. 20	....do	181	500	4.92	877
28	C. L. Chatfield	185	479	5.09	803
Dec. 30	G. H. Russell	182	435	5.32	635

Daily gage height, in feet, and discharge, in second-feet, of Grand River at Glenwood Springs, Colo., for 1910.

[W. H. Richardson, observer.]

Day.	January.		February.		March.		April.		May.		June.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	3.55	960	3.3	775	3.3	775	4.3	1,750	6.95	7,000	8.8	14,300
2	3.8	1,190	3.3	775	3.65	1,040	4.3	1,750	6.65	6,200	8.65	13,400
3	3.7	1,090	3.3	775	3.9	1,290	4.35	1,820	6.4	5,550	8.75	14,000
4	3.55	960	3.2	705	3.9	1,290	4.4	1,880	6.2	5,050	8.75	14,000
5	3.45	882	3.1	640	4.05	1,460	4.3	1,750	6.25	5,120	8.45	12,400
6	3.3	775	3.1	640	4.3	1,750	4.2	1,630	6.3	5,250	8.05	10,400
7	3.3	775	3.1	640	4.3	1,750	4.25	1,690	6.2	5,000	7.90	9,400
8	3.25	740	3.2	705	4.35	1,820	4.3	1,750	6.1	4,800	7.75	9,200
9	3.3	775	3.2	705	4.4	1,880	4.4	1,880	6.3	5,230	7.45	8,100
10	3.35	810	3.2	705	4.2	1,630	4.6	2,160	6.9	6,800	7.2	7,400
11	3.4	845	3.2	705	4.2	1,630	4.8	2,450	7.25	7,800	7.15	7,280
12	3.4	845	3.2	705	4.1	1,510	4.95	2,680	7.7	9,250	.....	7,200
13	3.3	775	3.25	740	4.1	1,510	5.0	2,750	7.65	9,100	.....	7,100
14	3.3	775	3.3	775	4.3	1,750	5.15	2,980	7.45	8,400	.....	7,000
15	3.3	775	3.3	775	4.3	1,750	5.05	2,820	.....	7,800	.....	6,800
16	3.4	845	3.2	705	4.35	1,820	4.8	2,450	.....	7,000	.....	6,600
17	3.45	882	3.0	580	4.4	1,880	4.7	2,300	6.75	6,320	.....	6,400
18	3.45	882	3.1	640	4.45	1,950	4.75	2,380	.....	6,150	.....	6,300
19	3.3	775	3.2	705	4.55	2,090	4.8	2,450	.....	6,000	.....	6,100
20	3.3	775	3.3	775	4.6	2,160	5.05	2,820	.....	5,800	.....	6,000
21	3.4	845	3.3	775	4.7	2,300	5.4	3,410	.....	5,650	.....	5,800
22	3.35	810	3.3	775	4.85	2,520	5.55	3,700	6.5	5,600	.....	5,700
23	3.4	845	3.3	775	4.9	2,600	5.45	3,500	6.4	5,350	.....	5,500
24	3.4	845	3.3	775	4.95	2,680	5.65	3,900	6.35	5,200	.....	5,400
25	3.45	882	3.3	775	4.85	2,520	6.1	4,890	6.4	5,350	.....	5,200
26	3.35	810	3.35	810	4.75	2,380	6.1	4,890	6.55	5,700	.....	5,000
27	3.3	775	3.3	775	4.65	2,230	6.45	5,720	6.7	6,050	.....	4,900
28	3.35	810	3.35	810	4.7	2,300	6.8	6,660	6.95	6,700	.....	4,800
29	3.3	775	.....	.....	4.4	1,880	7.05	7,360	7.7	9,000	.....	4,600
30	3.3	775	.....	.....	4.4	1,880	7.15	7,660	8.35	11,900	.....	4,500
31	3.3	775	.....	.....	4.3	1,750	.....	.....	8.65	13,400	.....	.....

NOTE.—Daily discharge Jan. 1 to June 11 determined from a fairly well defined discharge rating curve by direct application Jan. 1 to Apr. 30, and by the indirect method for shifting channels May 1 to June 11. Gage heights from June 11 to Dec. 31 are practically useless, as the trough connecting float well with the river became clogged, and therefore they have not been published. Discharge May 15, 16, and 18 to 21 and June 12 to Dec. 31, used in computing monthly means, obtained from hydrographs of discharge at Kremmling, Palisades, and Roaring Fork stations and current-meter measurements at this station.

Monthly discharge of Grand River at Glenwood Springs, Colo., for 1910.

[Drainage area, 4,520 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,190	740	841	0.186	0.21	51,700	B.
February	810	580	730	.162	.17	40,500	B.
March	2,680	775	1,860	.409	.47	114,000	B.
April	7,660	1,630	3,190	.706	.79	190,000	B.
May	13,400	.....	6,760	1.50	1.73	416,000	C.
June	.....	.....	7,690	1.70	1.90	458,000	D.
July	.....	.....	2,230	.493	.57	137,000	D.
August	.....	.....	1,330	.294	.34	81,800	D.
September	.....	.....	1,370	.303	.34	81,500	D.
October	.....	.....	988	.219	.25	60,800	D.
November	.....	.....	903	.200	.22	53,700	D.
December	.....	.....	665	.147	.17	40,900	D.
The year	.....	.....	2,380	.527	7.16	1,730,000	

GRAND RIVER NEAR PALISADES, COLO.[1]

This station, which is located at a steel highway bridge 2 miles above Palisades, Colo., at a point where the river enters Grand Valley, was established April 9, 1902, and during 1910 was maintained in cooperation with the United States Reclamation Service.

The station is below all important tributaries except Gunnison and Dolores rivers and is above all the irrigating ditches supplying water for irrigation in Grand Valley, except a ditch for one pumping plant which diverts about 80 second-feet for irrigation one-fourth mile above the gage. The proposed high-line canal of the United States Reclamation Service will take its water about 7 miles above Palisades.

The gage has been permanently located at the highway bridge above Palisades and no change in datum has been made. The original wire gage was replaced by a chain gage April 5, 1904. The river usually freezes over a portion of the year, but except for the interference of slush ice and an occasional thin ice cover the winter records are good.

Conditions for current meter measurements at the gage are poor, especially at high water. Beginning September 27, 1905, the measurements were made from a suspension bridge in the town of Palisades. Measurements are now made from the new steel bridge opened in the spring of 1909. Conditions at both these bridges are about the same. The sections are permanent, but at flood stages the velocities are high and the interference of bridge piers somewhat impairs the accuracy of results. Flood measurements prior to 1906 made at the upper bridge, where the gage is located, are less reliable than those made at the lower bridges.

Discharge measurements of Grand River near Palisades, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 2	S. O. Harper	257	1,080	13.6	3,070
27	Freeman and Sovereign	328	2,050	16.6	10,700
June 13	R. H. Bolster	360	2,410	17.7	13,800
Aug. 5	Harper and Hoag	268	1,120	13.5	2,890
Sept. 1	Harper and Henderson	256	734	12.5	1,530
23	.....do	257	992	13.25	2,520

[1] Called "at Palisades" in Water-Supply Paper 249.

Daily gage height, in feet, of Grand River near Palisades, Colo., for 1910.

[I. W. Penny, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.5	.....	13.1	13.65	17.75	20.55	15.4	14.25	12.5	12.65	12.65	12.35
2	14.3	.....	13.35	13.65	17.3	20.3	15.35	14.15	12.5	12.9	12.55	12.35
3	13.8	.....	13.7	13.75	16.9	20.3	15.15	13.7	12.5	12.8	12.55	12.3
4	12.95	.....	14.0	13.7	16.45	20.3	14.9	13.6	13.4	12.75	12.6	12.35
5	12.75	.....	13.8	13.65	16.45	20.1	14.8	13.5	13.5	12.7	12.5	12.3
6	12.7	.....	14.0	13.65	16.6	19.65	14.8	13.5	13.4	12.75	12.5	12.25
7	12.6	.....	13.85	13.6	16.55	19.2	14.65	13.6	13.5	12.8	12.45	12.25
8	.....	.....	13.8	13.6	16.45	18.9	14.5	13.45	13.25	12.75	12.55	12.25
9	.....	.....	13.7	13.65	16.6	18.55	14.4	13.25	13.15	12.75	12.55	12.25
10	.....	.....	13.6	13.9	17.4	18.05	14.25	13.1	13.05	12.8	12.6	12.25
11	.....	.....	13.7	14.2	18.35	17.95	14.1	12.95	12.95	12.65	12.55	12.45
12	.....	.....	13.7	14.45	18.65	17.95	13.95	13.35	12.75	12.55	12.6	12.5
13	.....	.....	13.3	14.65	18.85	17.85	13.85	13.25	12.85	12.5	12.65	12.4
14	.....	.....	13.45	14.8	18.55	17.7	13.7	13.25	13.2	12.5	12.6	12.35
15	.....	.....	13.6	14.7	18.05	17.45	13.6	13.2	13.15	12.55	12.7	12.3
16	.....	.....	13.3	14.45	17.75	17.15	13.5	13.15	12.9	13.3	12.65	12.25
17	.....	.....	13.5	14.35	17.5	17.2	13.45	13.1	13.2	12.9	12.75	12.25
18	.....	.....	13.65	14.2	17.1	16.95	13.4	12.95	13.2	12.95	12.75	12.25
19	.....	.....	13.4	14.35	16.85	16.8	13.4	12.9	13.1	13.0	13.25	12.05
20	.....	.....	13.5	14.7	16.75	16.65	13.4	12.8	13.1	13.05	12.95	11.95
21	.....	.....	14.1	15.05	16.65	16.45	13.4	12.65	13.4	12.95	12.7	12.2
22	.....	.....	14.4	15.45	16.65	16.25	13.3	12.7	13.35	12.85	12.55	12.1
23	.....	.....	14.5	15.35	16.55	16.15	13.25	12.7	13.2	12.85	12.55	12.1
24	.....	.....	14.5	15.35	16.45	15.95	13.15	12.7	13.2	12.75	12.55	12.0
25	.....	13.0	14.45	15.65	16.75	15.75	13.1	12.65	13.15	12.65	12.5	12.1
26	.....	13.35	14.45	16.2	16.9	15.55	13.0	12.6	13.0	12.65	12.6	12.1
27	.....	13.0	14.35	16.8	17.25	15.45	12.9	12.65	12.85	12.7	12.55	12.1
28	.....	12.85	14.0	17.3	17.65	15.3	13.4	12.65	12.8	12.65	12.5	12.15
29	.....	.....	13.9	17.75	18.7	15.65	13.2	12.55	12.8	12.65	12.45	12.2
30	.....	.....	13.8	18.05	19.55	15.4	13.7	12.5	12.7	12.55	12.35	12.25
31	.....	.....	13.6	.....	19.65	.....	13.8	12.5	.....	12.65	.....	12.3

NOTE.—Relation between gage height and discharge affected by ice during January and February and Dec. 28 to 31. River frozen over Jan. 8 to Feb. 25.

Daily discharge, in second-feet, of Grand River near Palisades, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,280	3,160	14,200	27,100	6,810	4,290	1,530	1,700	1,700	1,370
2	2,650	3,160	12,500	25,800	6,700	4,090	1,530	2,010	1,580	1,370
3	3,250	3,340	11,100	25,800	6,240	3,250	1,530	1,880	1,580	1,320
4	3,800	3,250	9,650	25,800	5,680	3,070	2,730	1,820	1,640	1,370
5	3,430	3,160	9,650	24,700	5,460	2,900	2,900	1,760	1,530	1,320
6	3,800	3,160	10,100	22,500	5,460	2,900	2,730	1,820	1,530	1,280
7	3,520	3,070	9,970	20,300	5,130	3,070	2,900	1,880	1,480	1,280
8	3,430	3,070	9,650	19,000	4,810	2,820	2,500	1,820	1,580	1,280
9	3,250	3,160	10,100	17,400	4,600	2,500	2,350	1,820	1,580	1,280
10	3,070	3,610	12,900	15,400	4,290	2,280	2,210	1,880	1,640	1,280
11	3,250	4,190	16,600	15,000	3,990	2,080	2,080	1,600	1,580	1,480
12	3,250	4,700	17,900	15,000	3,700	2,650	1,820	1,580	1,640	1,530
13	2,570	5,130	18,700	14,600	3,520	2,500	1,940	1,530	1,700	1,420
14	2,820	5,460	17,400	14,000	3,250	2,500	2,420	1,530	1,640	1,370
15	3,070	5,240	15,400	13,000	3,070	2,420	2,350	1,580	1,760	1,320
16	2,570	4,700	14,200	12,000	2,900	2,350	2,010	2,570	1,700	1,280
17	2,900	4,500	13,200	12,100	2,820	2,280	2,420	2,010	1,820	1,280
18	3,160	4,190	11,800	11,300	2,730	2,080	2,420	2,080	1,820	1,280
19	2,730	4,500	10,900	10,800	2,730	2,010	2,280	2,140	2,500	1,120
20	2,900	5,240	10,600	10,300	2,730	1,880	2,280	2,210	2,080	1,050
21	3,990	6,010	10,300	9,650	2,730	1,700	2,730	2,080	1,760	1,230
22	4,600	6,930	10,300	9,030	2,570	1,760	2,650	1,940	1,580	1,150
23	4,810	6,700	9,970	8,740	2,500	1,760	2,420	1,940	1,580	1,150
24	4,810	6,700	9,650	8,180	2,350	1,760	2,420	1,820	1,580	1,080
25	4,700	7,410	10,600	7,660	2,280	1,700	2,350	1,700	1,530	1,150
26	4,700	8,880	11,100	7,170	2,140	1,640	2,140	1,700	1,640	1,150
27	4,500	10,800	12,300	6,930	2,010	1,700	1,940	1,760	1,580	1,150
28	3,800	12,500	13,800	6,580	2,730	1,700	1,880	1,700	1,530	1,150
29	3,610	14,200	18,100	7,410	2,420	1,580	1,880	1,700	1,480	1,150
30	3,430	15,400	22,000	6,810	3,250	1,530	1,760	1,580	1,370	1,150
31	3,070	.....	22,500	.....	3,430	1,530	.....	1,700	.....	1,150

NOTE.—Daily discharge determined from a discharge rating curve well defined below 4,000 second-feet. Discharge Dec. 28 to 31 estimated.

Monthly discharge of Grand River near Palisades, Colo., for 1910.

[Drainage area, 8,550 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March	4,810	2,280	3,470	0.406	0.47	213,000	B.
April	15,400	3,070	5,850	.684	.76	348,000	B.
May	22,500	9,650	13,100	1.53	1.76	806,000	B.
June	27,100	6,580	14,300	1.67	1.86	851,000	B.
July	6,810	2,010	3,710	.434	.50	228,000	A.
August	4,290	1,530	2,330	.273	.31	143,000	A.
September	2,900	1,530	2,240	.262	.29	133,000	A.
October	2,570	1,530	1,830	.214	.25	113,000	A.
November	2,500	1,370	1,660	.194	.22	98,800	A.
December	1,530	1,050	1,260	.147	.17	77,500	B.
The period						3,000,000	

NORTH INLET TO GRAND LAKE AT GRAND LAKE, COLO.

Two streams, known as the North and East inlets, flow into Grand Lake, North Inlet being the larger. Elevations of the basin in the North Inlet range from 8,000 to 11,000 feet above sea level and the fall of the stream is very great. The basin comprises 36.5 square miles.

The gaging station on the North Inlet, which is located at the foot bridge across the stream, 300 yards east of the Grand Lake post office and about 100 yards north of the mouth, was established August 3, 1905, discontinued September 30, 1909, and reestablished September 20, 1910.

No water is diverted above the station, but filings have been made on sites for power development.

A staff gage, unchanged in datum during the maintenance of the station, is attached to the bridge. The records are fragmentary, as the gage has not been read continuously.

The stream is covered with thick ice for about four months, and winter gage readings are therefore of little value. The accuracy of the records is impaired by the roughness of the stream bed and by the effect of ice.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of North Inlet to Grand Lake at Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 3	W. B. Freeman	54.3	148	2.68	96
Sept. 20	S. T. Harding	48	57	2.41	57

Daily gage height, in feet, and discharge, in second-feet, of North Inlet to Grand Lake at Grand Lake, Colo., for 1910.

[Truman Smith, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.22	35	2.04	19	2.4	
2				34	2.04	19	2.4	
3			2.20	33	2.03	18	2.4	
4			2.15	28	2.03	18	2.4	
5			2.12	26	2.03	18	2.4	
6			2.10	24	2.02	18	2.4	
7			2.08	22	2.02	18	2.4	
8			2.05	20	2.02	18	2.4	
9			2.02	18	2.01	17	2.4	
10			2.02	18	2.01	17	2.4	
11			2.00	16	2.01	17	2.4	
12				17	2.00	16	2.4	
13				18	2.00	16	2.4	
14				19	2.00	16	2.4	
15				20	2.00	16	2.4	
16				21	2.00	16	2.4	
17				22	2.02	18	2.4	
18				23	2.04	19	2.4	
19				24	2.05	20	2.4	
20	2.41	57	2.10	24	2.08	20	2.4	
21	2.60	84	2.37	24	2.10	20	2.4	
22	2.52	72	2.40	24	2.20	20	2.4	
23	2.45	62	2.20	24	2.25	20	2.4	
24	2.40	56	2.10	24	2.30	20	2.4	
25	2.40	56	2.06	21	2.30	20	2.4	
26	2.38	54	2.06	21	2.38	20	2.4	
27	2.35	50	2.05	20	2.34	20	2.4	
28	2.30	44	2.05	20	2.38	20	2.4	
29	2.28	42	2.05	20	2.38	20	2.4	
30	2.25	38	2.05	20	2.40	20	2.4	
31			2.05	20			2.4	

NOTE.—Gage heights, Oct. 21–23, and Nov. 19 to Dec. 31, affected by ice.
Discharge interpolated Oct. 12–19 and estimated Oct. 21–23 and Nov. 19–30. Other discharges are based on a rating table that is well defined.

Monthly discharge of North Inlet to Grand Lake at Grand Lake, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
September 20–30	84	38	55.9	1,220	B.
October	35	16	22.6	1,390	B.
November	20	16	18.5	1,100	B.

GRAND LAKE OUTLET AT GRAND LAKE, COLO.

This station, which is located at a footbridge at the west end of Grand Lake, about half a mile south of Grand Lake post office, Colo., in sec. 6, T. 3 N., R. 75 W., was established July 31, 1904, discontinued September 30, 1909, and reestablished September 20, 1910. Granby, about 15 miles distant, on the Denver, Northwestern & Pacific Railway, is the nearest railroad point.

The drainage area at the station is 62 square miles.

A staff gage, unchanged in location or datum, is installed at the footbridge.

Discharge measurements have been taken at various sections, more usually at a ford one-fourth mile downstream from the footbridge.

Shore ice forms at the station for about four months, but the stream does not freeze over because of the higher temperature of the water coming down Grand Lake.

During low stages the accuracy of the results is to a considerable extent impaired by the rough bottom and sluggish character of the stream.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of Grand Lake Outlet at Grand Lake, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	W. B. Freeman	64	136	2.49	204
Sept. 20	S. T. Harding	128	107	2.21	111

NOTE.—The following gage heights were also observed: Sept. 20, 2.22; Sept. 24, 2.24; Oct. 3, 1.82; Oct. 10, 1.70; Oct. 26, 1.70; Nov. 9, 1.52; Dec. 14, 1.50; Dec. 24, 1.50.

FRASER RIVER NEAR FRASER, COLO.

This station, which is located about 10 miles above Fraser post office, Colo., was established May 1, 1908.

The station is at an elevation of approximately 10,000 feet above sea level.

The drainage area is about 9 square miles. Currant Creek is the only important tributary above.

The location and datum of the Lallie automatic gage have remained constant since the station was established.

The measuring section is permanent, but no discharge measurements were made during 1910.

Data for this station in 1909 have been furnished through the courtesy of the Denver Reservoir & Irrigation Co.

Daily gage height, in feet, and discharge, in second-feet, of Fraser River near Fraser, Colo., for 1910.

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.6	.....	0.4	10	0.35	8	0.25	7	0.2	6
2	.55	.....	.4	10	.35	8	.25	7	.2	6
3	.55	.....	.4	10	.35	8	.25	7	.2	6
4	.6	.....	.4	10	.35	8	.25	7	.2	6
5	.6	.....	.4	10	.35	8	.25	7	.2	6
6	.55	.....	.4	10	.35	8	.25	7	.2	6
7	.55	.....	.4	10	.35	8	.25	7	.2	6
8	.55	.....	.4	10	.35	8	.25	7	.2	6
9	.5	.....	.4	10	.35	8	.25	7	.2	6
10	.5	.....	.4	10	.35	8	.25	7	.2	6
11	.5	.....	.35	8	.35	8	.25	7	.2	6
12	.5	.....	.35	8	.35	8	.2	6	.2	6
13	.5	.....	.35	8	.35	8	.2	6	.2	6
14	.5	.....	.35	8	.35	8	.2	6	.2	6
15	.5	.....	.35	8	.35	8	.2	6	.2	6
16	.5	15	.35	8	.35	8	.2	6	.2	.....
17	.5	15	.35	8	.35	8	.2	6	.2	.....
18	.5	15	.35	8	.35	8	.2	6	.2	.....
19	.45	13	.35	8	.35	8	.2	6	.2	.....
20	.45	13	.35	8	.3	7.5	.2	6	.2	.....
21	.45	13	.35	8	.3	7.5	.2	6	.2	.....
22	.45	13	.35	8	.3	7.5	.2	6	.2	.....
23	.45	13	.35	8	.3	7.5	.2	6	.2	.....
24	.45	13	.35	8	.3	7.5	.2	6	.2	.....
25	.45	13	.35	8	.3	7.5	.2	6	.2	.....
26	.45	13	.35	8	.3	7.5	.2	6	.2	.....
27	.45	13	.35	8	.3	7.5	.2	6	.2	.....
28	.45	13	.35	8	.3	7.5	.2	6	.2	.....
29	.45	13	.35	8	.3	7.5	.2	6	.2	.....
30	.4	10	.35	8	.3	7.5	.2	6	.2	.....
31	.4	10	.....	.....	.25	7	.....	.....	.2	.....

Monthly discharge of Fraser River near Fraser, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
August 16–31	15	10	13.0	413
September	10	8	8.7	518
October	8	7.5	7.8	480
November	7	6	6.4	381
December 1–15	6	6	6.0	178
The period				1,970

FRASER RIVER NEAR ARROW, COLO.

This station, which is located one-fourth mile from the Idlewild ranger station, at the lower of two log bridges on the Idlewild-Arrow trail, in sec. 10, T. 2 N., R. 75 W., 2 miles from Arrow and one-fourth mile from Irving, on the Denver, Northwestern & Pacific Railway, was established September 23, 1910.

The drainage area at this point is about 24 square miles.

The gage is a vertical rod fastened to the center downstream pile of the bridge.

The stream bed is rough and rocky.

Discharge measurements are made from the upstream side of the bridge.

The relation between gage heights and discharge is probably affected by ice for three or four months each year.

Gage heights for this station are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

September 24, 1910: Width, 25 feet; area, 15 square feet; gage height, 0.78 feet; discharge, 18 second-feet.

Daily gage height, in feet, of Fraser River near Arrow, Colo., for 1910.

[S. S. Linscott, observer.]

Oct. 2	0.8	Oct. 13	0.75
3	.75	14	.75
4	.8	15	.75
5	.8	16	.75
6	.8	17	.7
7	.75	18	.7
8	.8	19	.7
9	.75	20	.75
10	.75	21	.7
11	.75	22	.7
12	.75		

WILLIAMS FORK NEAR SCHOLL, COLO.

Williams Fork rises in the Williams River Mountains and flows northwestward to its junction with Grand River in the central part of Middle Park.

This station, which is located near the Arapahoe National Forest, in sec. 2, T. 2 S., R. 78 W., near the line of the township, 100 feet below the bridge leading to the ranger station, 15 miles from Parshall, and 20 miles from Sulphur Springs on the Denver, Northwestern & Pacific Railway, was established September 22, 1910. Scholl is the nearest post office.

The drainage area above the station is 120 square miles.

The gage is a vertical rod on the right bank, 100 feet below the bridge to the ranger station.

The stream bed is rough and rocky and the stream falls rapidly throughout its course.

Discharge measurements are made by wading below the gage.

Gage heights for this station are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

September 22, 1910: Width, 36 feet; area, 46 square feet; gage height, 1.50 feet; discharge, 91 second-feet.

Daily gage height, in feet, of Williams Fork near Scholl, Colo., for 1910.

[W. M. Thomas, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		1.35	1.35	1.1	11		1.3	1.35	0.95	21		1.4	1.25	
2		1.4	1.3	1.1	12		1.3	1.35	.9	22		1.4	1.2	
3		1.4	1.3	1.05	13		1.3	1.25	.8	23			1.2	
4		1.35	1.35	1.0	14		1.3	1.3	.8	24			1.25	
5		1.3	1.35	1.0	15		1.3	1.35	.8	25			1.2	
6		1.35	1.35		16		1.3	1.35	.8	26		1.4	1.2	
7		1.3	1.35		17		1.5	1.3	.75	27		1.35	1.2	
8		1.3	1.35	.9	18		1.4	1.25	.7	28		1.35	1.2	0.5
9		1.3	1.4	.9	19		1.4	1.3	.7	29		1.45	1.35	1.1	.5
10		1.3	1.35	.95	20		1.35	1.25		30		1.45	1.4	1.1	.5
										31			1.35		.4

WILLIAMS FORK NEAR SULPHUR SPRINGS, COLO.

This station, which is located near the mouth of the stream, at the wagon bridge on the ranch of F. A. Field, about 9 miles west of Hot Sulphur Springs, Colo., was established July 25, 1904. The nearest railroad point is Parshall, a station on the Denver, Northwestern & Pacific Railway.

The drainage area is about 200 square miles.

The station is below all tributaries. A number of irrigation ditches divert water below the station. Some work has been done toward the construction of a reservoir and power plant a couple of miles downstream from the station.

Springs keep the ice from getting very thick at this station, but slush ice occurs frequently throughout the winter. The morning gage readings are usually distorted as the result of ice at the gage, but the afternoon readings indicate the open-water stage closely.

No change has been made in the location or in the datum of the staff gage at the bridge during the maintenance of the station.

Results are satisfactory. During low stages in the winter the flow is constant, being nearly all from springs.

Discharge measurements of Williams Fork near Sulphur Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 11	H. A. Howe	22	40	2.95	40
Mar. 4	do	24	46	3.05	54
31	do	26	48	3.25	59
Apr. 25	do	42	82	3.60	141
May 15	do	49	108	4.00	292
July 2	Freeman and Bolster	48	96	3.75	195
28	C. L. Chatfield	55	71	3.30	78
Sept. 15	S. T. Harding	27	58	3.20	80
17	C. L. Chatfield	27	54	3.25	78
Oct. 9	do		55	3.18	64

Daily gage height, in feet, of Williams Fork near Sulphur Springs, Colo., for 1910.

[F. A. Field, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.18	3.01	3.00	3.27	3.82	4.64	3.78	3.52	3.04	3.20	3.10	3.10
2	3.15	.00	3.02	3.27	3.78	4.56	3.72	3.48	3.04	3.22	3.10	3.12
3	3.12	3.01	3.02	3.25	3.78	4.72	3.68	3.48	3.04	3.24	3.08	3.10
4	3.12	3.01	3.05	3.24	3.76	4.74	3.69	3.36	3.41	3.25	3.07	3.10
5	3.14	3.02	3.02	3.25	3.82	4.64	3.72	3.42	3.42	3.22	3.05	3.10
6	3.18	3.00	3.02	3.26	3.78	4.58	3.66	3.40	3.43	3.20	3.03	3.10
7	3.18	3.00	3.03	3.30	3.72	4.59	3.58	3.32	3.25	3.20	3.00	3.10
8	3.20	3.02	3.05	3.32	3.88	4.58	3.54	3.26	3.19	3.20	3.08	3.12
9	3.18	3.01	3.05	3.38	3.90	4.55	3.50	3.24	3.19	3.18	3.10	3.10
10	3.14	2.98	3.03	3.42	4.04	4.50	3.45	3.21	3.16	3.15	3.14	3.14
11	3.10	2.95	3.10	3.46	4.12	4.38	3.42	3.20	3.19	3.16	3.12	3.14
12	3.10	3.01	3.10	3.46	4.20	4.36	3.42	3.24	3.24	3.16	3.11	3.10
13	3.10	3.01	3.12	3.38	4.12	4.36	3.41	3.28	3.22	3.15	3.11	3.00
14	3.12	3.02	3.15	3.37	4.14	4.34	3.35	3.20	3.24	3.16	3.14	2.98
15	3.12	2.98	3.25	3.42	4.06	4.28	3.32	3.20	3.24	3.17	3.14	2.90
16	3.12	2.96	3.25	3.23	4.00	4.27	3.28	3.22	3.22	3.18	3.13	2.93
17	3.10	2.98	3.35	3.28	3.98	4.19	3.31	3.15	3.26	3.33	3.11	2.93
18	3.10	2.97	3.42	3.36	3.92	4.14	3.31	3.11	3.38	3.35	3.06	2.90
19	3.10	2.97	3.45	3.39	3.90	4.15	3.37	3.10	3.42	3.36	3.05	2.90
20	3.10	2.98	3.48	3.50	3.86	4.15	3.36	3.10	3.44	3.34	3.10	2.95
21	3.10	3.00	3.50	3.62	3.88	4.12	3.34	3.10	3.44	3.34	3.18	3.00
22	3.12	2.98	3.50	3.59	3.90	4.04	3.29	3.10	3.42	3.34	3.10	3.00
23	3.10	2.98	3.58	3.52	3.99	3.96	3.24	3.08	3.41	3.26	3.10	3.00
24	3.08	2.98	3.65	3.56	4.00	3.96	3.18	3.06	3.38	3.23	3.12	3.10
25	3.08	2.97	3.68	3.60	3.88	3.88	3.16	3.03	3.36	3.21	3.10	3.05
26	3.10	2.97	3.58	3.68	3.96	3.86	3.12	3.01	3.34	3.20	3.08	3.05
27	3.10	2.98	3.58	3.82	3.96	3.84	3.10	3.01	3.31	3.12	3.12	3.00
28	3.10	2.98	3.55	3.90	4.10	3.80	3.50	3.04	3.28	3.05	3.18	3.00
29	3.05	.....	3.50	3.96	4.35	3.93	3.80	3.03	3.21	3.15	3.10	3.02
30	3.03	.....	3.55	3.91	4.46	3.88	3.78	3.00	3.21	3.10	3.10	3.05
31	3.00	.....	3.30	.....	4.61	.....	3.58	3.00	.....	3.08	.....	3.05

NOTE.—Gage heights practically unaffected by ice.

Daily discharge, in second-feet, of Williams Fork near Sulphur Springs, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	66	51	50	76	218	748	202	120	53	68	58	58
2	63	50	52	76	202	674	180	111	53	70	58	58
3	60	51	52	74	202	825	166	111	53	72	56	60
4	60	51	54	73	195	845	169	89	97	74	56	58
5	62	52	52	74	218	748	180	99	99	70	54	58
6	66	50	52	75	202	692	159	95	101	68	52	58
7	66	50	52	80	180	701	135	83	74	68	50	58
8	68	52	54	83	242	692	125	75	67	68	56	60
9	66	51	54	92	250	665	115	72	67	66	58	58
10	62	49	52	99	315	620	105	69	64	63	62	62
11	58	47	58	107	356	525	99	68	67	64	60	62
12	58	51	58	107	400	510	99	72	72	64	59	58
13	58	51	60	92	356	510	97	78	70	63	59	50
14	60	52	63	90	367	495	88	68	72	64	62	49
15	60	49	74	99	325	452	83	68	72	65	62	44
16	60	48	74	72	295	446	78	70	70	66	61	46
17	58	49	88	78	286	394	82	63	75	84	59	46
18	58	48	99	89	259	367	82	59	92	88	55	44
19	58	48	105	94	250	372	90	58	99	89	54	44
20	58	49	111	115	234	372	89	58	103	86	58	44
21	58	50	115	146	242	356	86	58	103	86	66	50
22	60	49	115	138	250	315	79	58	99	86	58	50
23	58	49	135	120	290	277	73	56	97	75	58	50
24	56	49	156	130	295	277	66	55	92	71	60	58
25	56	48	166	140	242	242	64	52	89	69	58	54
26	58	48	135	166	277	234	60	51	86	68	56	54
27	58	49	135	218	277	226	58	51	82	60	60	50
28	58	49	128	250	345	210	115	53	78	54	66	50
29	54	.....	115	277	502	264	210	52	69	63	58	52
30	52	.....	128	254	588	242	202	50	69	58	58	54
31	50	.....	80	.....	720	.....	135	50	.....	56	.....	54

NOTE.—Daily discharge determined from a rating curve well defined between 40 and 350 second-feet.

Monthly discharge of Williams Fork near Sulphur Springs, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	68	50	59.5	3,660	B.
February	52	47	49.6	2,760	B.
March	166	50	87.8	5,400	B.
April	277	72	119	7,080	A.
May	720	180	303	18,600	A.
June	845	210	477	28,400	B.
July	210	58	115	7,070	A.
August	120	50	70.1	4,310	A.
September	103	53	79.5	4,730	B.
October	89	54	69.9	4,300	A.
November	62	50	58.2	3,460	B.
December	62	44	53.4	3,280	B.
The year	845	44	128	93,000	

BLUE RIVER BASIN.

BLUE RIVER AT DILLON, COLO.

Blue River rises among the peaks of the Continental Divide in the extreme southeastern part of Summit County, Colo., and flows in a general northwesterly direction to its junction with Grand River above the point where the latter stream enters Gore Canyon.

This station, which is located at the second bridge on the road past the depot from the town to the cemetery, was established October 15, 1910.

The gage is a vertical rod fastened to the right abutment on the downstream side of the bridge.

High-stage measurements are made from the bridge. At ordinary and low stages measurements are made by wading just below the bridge.

No water is diverted above this station.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 31 feet; area, 41 square feet; gage height, 1.50 feet; discharge, 41 second-feet.

Daily gage height, in feet, of Blue River at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1			1.6	11				21		1.4	
2		1.4		12		1.3	1.8	22	1.45		
3		1.35		13				23			1.9
4				14				24	1.45		
5				15	1.5			25			
6			2.0	16		1.3		26		1.5	
7		1.4		17	1.4	1.3		27			
8		1.4		18	1.4	1.4		28	1.5		
9				19			2.0	29	1.6		
10		1.4		20	1.5			30		1.5	
								31			

NOTE.—Gage heights during December affected by ice.

TENMILE CREEK AT DILLON, COLO.

This station, which is located at the highway bridge about 400 yards past the depot at Dillon on the cemetery road and about 300 yards above the mouth of the creek, was established October 15, 1910.

The drainage area above this station is 125 square miles.

The gage is a vertical rod fastened to the downstream left side of center triangular pier of bridge.

High-stage measurements will be made from the bridge. At low and ordinary stages measurements are made by wading below the bridge.

No water is diverted above this station.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 28 feet; area, 44 square feet; gage height, 1.82 feet, discharge, 27 second-feet.

Daily gage height, in feet, of Tenmile Creek at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1			1.9	11				21		1.6	
2		1.7		12		1.6	2.1	22	1.75		
3		1.8		13				23			2.0
4				14				24	1.75		
5				15	1.8			25			
6			2.9	16		1.7		26		1.7	
7		1.8		17	1.8	1.8		27			
8		1.8		18	1.8	1.8		28	1.8		
9				19			1.8	29	1.9		
10		1.75		20	1.7			30		1.7	
								31			

NOTE.—Gage heights during December affected by ice.

SNAKE RIVER AT DILLON, COLO.

This station, which is located at the first bridge 200 yards above the mouth on the road to Sterne Siding, was established October 15, 1910.

Water is diverted above this station by the Summit County Power Co.

The gage is a vertical rod fastened to the right abutment on the downstream side of the bridge.

High-stage measurements are made from the bridge. At low stages measurements are made by wading near the bridge.

The gage heights are furnished by the Forest Service.

The following discharge measurement was made by S. T. Harding:

October 15, 1910: Width, 14 feet; area, 9 square feet; gage height, 0.70 feet; discharge, 9.8 second-feet.

Daily gage height, in feet, of Snake River at Dillon, Colo., for 1910.

[I. W. Blundell, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1			0.9	11				21		0.5	
2		0.8		12		0.6	1.5	22	0.65		
3		.8		13				23			0.6
4				14				24	.65		
5				15	0.7			25			
6			.9	16		.7		26		.6	
7		.8		17	.6	.6		27			
8		.6		18	.6	.7		28	.7		
9				19			1.0	29	.8		
10		.7		20	.6			30		.6	
								31			

NOTE.—Gage heights during December affected by ice.

ROARING FORK BASIN.

ROARING FORK AT GLENWOOD SPRINGS, COLO.

Roaring Fork, one of the largest tributaries of the Grand, drains an area lying chiefly in Pitkin County and reaches to the summit of the Continental Divide. Frying Pan and Crystal rivers are its most important branches.

This station, which is located on a single-span wooden road bridge about four blocks west of Grand Avenue, Glenwood Springs, and about 500 feet above the junction of Roaring Fork with Grand River, was established April 6, 1906, discontinued September 30, 1909, and reestablished September 21, 1910.

A number of small irrigation ditches divert water from the stream and its tributaries. Three important power plants, located on Crystal River, Yule Creek, and Maroon and Castle creeks, develop 2,100 horsepower. A number of smaller plants are also in operation in this basin. The drainage area above this station is 1,450 square miles.

A chain gage, unchanged in location or datum, is attached to the bridge.

As the stream bed is very rough conditions are unfavorable for accurate measurements. The channel is, however, fairly permanent.

Slush and anchor ice are common at this station, but solid ice rarely covers the river. At extremely high stages in Grand River backwater from that stream may somewhat affect the relation between gage height and discharge at this station.

In general the results of observations at this station are satisfactory.

Since the reestablishment of the station gage heights have been furnished by the Forest Service.

Discharge measurements of Roaring Fork at Glenwood Springs, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	G. H. Russell	150	272	1.92	834
Nov. 20	do	149	193	1.30	465
29	C. L. Chatfield	158	183	1.30	448
Dec. 30	G. H. Russell	115	132	1.02	290

Daily gage height, in feet, and discharge, in second-feet, of Roaring Fork at Glenwood Springs, Colo., for 1910.

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.7	690	1.4	485	1.3	430
2			1.8	760	1.4	485	1.3	430
3			1.8	760	1.5	550	1.3	430
4			1.8	760	1.65	655	1.3	430
5			1.7	690	1.5	550	1.1	335
6			1.7	690	1.4	485	1.25	405
7			1.7	690	1.4	485	1.3	430
8			1.4	485	1.5	550	1.3	430
9			1.4	485	1.5	550	1.3	430
10			1.4	485	1.5	550	1.3	430
11			1.4	485	1.45	518	1.5	430
12			1.4	485	1.5	550	1.5	430
13			1.4	485	1.5	550	1.5	430
14			1.4	485	1.4	485	1.5	430
15			1.4	485	1.4	485	1.5	430
16			1.45	518		485		400
17			1.7	690		470		400
18			1.7	690		460		400
19			1.7	690		455		400
20			1.6	620		455		400
21	1.9	840	1.5	550	1.2	380		350
22	1.95	885	1.7	690	1.45	518		350
23	1.85	800	1.6	620	1.4	485		350
24	1.8	760	1.55	585	1.4	485		350
25	1.75	725	1.5	550	1.4	485		350
26	1.8	760	1.55	585	1.3	430		300
27	1.7	690	1.5	550	1.4	485		300
28	1.8	760	1.4	485	1.3	430		300
29	1.8	760	1.4	485	1.3	430		300
30	1.7	690	1.4	485	1.3	430		290
31			1.4	485				290

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge Nov. 16 to 20 and Dec. 11 to 31 estimated. Ice present Dec. 11 to 31.

Monthly discharge of Roaring Fork at Glenwood Springs, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
September 21–30	885	690	767	15,200	A.
October	760	485	587	36,100	B.
November	655		494	29,400	B.
December			383	23,600	C.
The period				104,000	

CRYSTAL RIVER NEAR MARBLE, COLO.

This station, which is located at the electric railway bridge near Marble, Colo., was established November 1, 1910. The drainage area above this station is 66 square miles.

The gage is of the hook type, consisting of a wooden rod with steel hook, which slides in ways fastened to the frame of the bridge. Readings are taken on the rod by means of a stationary iron indicator.

At low stages measurements can be made by wading; a cable and car will be installed for high-stage measurements.

No measurements were made during 1910.

Daily gage height, in feet, of Crystal River near Marble, Colo., for 1910.

[H. V. Knouse, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.1	1.9	11	2.1	1.95	21	2.0	1.95
2	2.1	1.95	12	2.05	2.0	22	2.05	1.95
3	2.05	2.0	13	2.05	1.95	23	2.1	1.95
4	2.15	2.05	14	2.05	1.95	24	2.0	1.95
5	2.1	2.0	15	2.05	1.95	25	2.1	1.95
6	2.0	1.95	16	2.05	1.95	26	2.05	2.0
7	2.0	2.05	17	2.05	1.95	27	2.05	1.95
8	2.05	2.0	18	2.05	1.95	28	1.95	1.95
9	2.1	2.0	19	2.05	1.95	29	2.0	1.9
10	2.0	2.0	20	1.9	1.95	30	1.95	1.95
						31		1.95

DIVIDE CREEK BASIN.

GENERAL FEATURES.

Divide Creek enters Grand River from the south about 6 miles below Newcastle, Colo. It is formed by East and West Divide creeks, which unite a few miles below the mouth of the stream. The run-off in this basin is derived chiefly from melting snows and from rain.

WEST DIVIDE CREEK AT BEARD'S RANCH, NEAR RAVEN CREEK, COLO.

This station, which is located at Beard's ranch, 1¼ miles below the head gates of the High Line ditch, was established April 28, 1910, and replaces the station maintained from July 27 to September 20, 1909, at Hostutler's ranch, one-fourth mile below the head gates of the ditch.

The drainage area above this station is 82 square miles.

The gage is a vertical rod fastened to an overhanging tree on the left bank 100 yards upstream from the ranch house.

The stream bed is composed of small bowlders and gravel and may shift somewhat.

At low and medium stages discharge measurements are made by wading at selected sections; at high stages they are made from a foot log 50 yards upstream from the gage.

Discharge measurements of West Divide Creek at Beard's ranch, near Raven, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	W. B. Freeman	20	67	2.68	225
May 18	do	18.5	55	2.00	117
July 7	G. H. Russell	13	5	.69	6

Daily gage height, in feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

[John W. Beard, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.5	1.9	0.75	0.45	0.0	0.3	0.8	0.8
2		2.4	1.8	.75	.5	.0	.35	.8	.8
3		2.25	1.8	.75	.4	.0	.5	.8	.8
4		2.2	1.6	.7	.35	.6	.55	.9	.7
5		2.4	1.5	.65	.5	.7	.5	.8	.65
6		2.3	1.35	.75	.6	.5	.45	.8	.65
7		2.2	1.2	.7	.6	.45	.45	.8	.7
8		2.3	1.1	.65	.45	.4	.45	.8	.8
9		2.5	1.2	.6	.35	.3	.5	.8	.9
10		2.65	1.25	.55	.2	.3	.5	.8	.85
11		2.6	1.3	.5	.0	.1	.55	.8	.9
12		2.55	1.3	.55	.0	.0	.5	.8	.9
13		2.4	1.3	.5	.25	.0	.6	.8	.9
14		2.4	1.25	.5	.6	.0	.6	.8	.95
15		2.3	1.2	.45	.5	.0	.7	.8	.95
16		2.2	1.2	.5	.5	.0	.8	.65	.95
17		2.1	1.15	.45	.4	.0	1.0	.65	.8
18		2.0	1.1	.45	.3	.0	.9	.65	.8
19		2.0	1.1	.4	.2	.25	.9	.7	.8
20		1.95	1.05	.45	.0	.45	.85	.7	.8
21		1.9	1.0	.4	.0	.4	.8	.7	.8
22		1.8	.95	.35	.0	.5	.8	.65	.8
23		1.8	.9	.3	.0	.5	.8	.7	.8
24		1.7	.85	.25	.0	.45	.75	.7	.8
25		1.7	.85	.1	.0	.4	.8	.75	.8
26		1.6	.85	.0	.0	.3	.75	.8	.8
27		1.55	.8	.0	.0	.3	.8	.8	.8
28		1.6	.85	.0	.0	.35	.8	.75	.8
29	2.85	1.7	.85	.0	.0	.3	.8	.8	.8
30	2.7	1.9	.85	.15	.0	.3	.8	.8	.75
31		1.95		.55	.0		.75		.75

NOTE.—Gage heights Dec. 11–16 affected by ice.

Daily discharge, in second-feet, of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		194	103	7.5	2.5	0	1.0	9	9
2		178	89	7.5	3	0	1.5	9	9
3		154	89	7.5	2	0	3	9	9
4		147	65	6	1.5	4	3.5	13	6
5		178	54	5	3	6	3	9	5
6		162	40	7.5	4	3	2.5	9	5
7		147	29	6	4	2.5	2.5	9	6
8		162	22	5	2.5	2	2.5	9	9
9		194	29	4	1.5	1	3	9	13
10		218	32	3.5	.5	1	3	9	11
11		210	36	3	0	.2	3.5	9	10
12		202	36	3.5	0	0	3	9	10
13		178	36	3	.8	0	4	9	10
14		178	32	3	4	0	4	9	10
15		162	29	2.5	3	0	6	9	10
16		147	29	3	3	0	9	5	10
17		132	25	2.5	2	0	17	5	9
18		117	22	2.5	1	0	13	5	9
19		117	22	2	.5	.8	13	6	9
20		110	20	2.5	0	3	11	6	9
21		103	17	2	0	2	9	6	9
22		89	15	1.5	0	3	9	5	9
23		89	13	1	0	3	9	6	9
24		77	11	.8	0	2.5	7.5	6	9
25		77	11	.2	0	2	9	6.5	9
26		65	11	0	0	1	7.5	9	9
27		60	9	0	0	1	9	9	9
28		65	11	0	0	1.5	9	7.5	9
29	252*	77	11	0	0	1	9	9	9
30	227	103	11	.4	0	1	9	9	7.5
31		110		3.5	0		7.5		7.5

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined. Discharge Dec. 11–16 estimated.

Monthly discharge of West Divide Creek at Beard's ranch, near Raven, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	218	60	136	8,360	A.
June	103	9	32.0	1,900	B.
July	7.5	0	3.11	191	B.
August	4	0	1.25	77	C.
September	6	0	1.38	82	C.
October	17	1	6.56	403	B.
November	13	5	7.97	474	B.
December	13	5	8.84	544	B.
The period				12,000	

WEST DIVIDE CREEK AT RAVEN, COLO.

This station, which is located at Ewer's ranch, at Raven, 18 miles southeast of Rifle and 15 miles southwest of Newcastle, was established September 20, 1910, replacing the station established three-quarter mile above on July 27, 1909.

The drainage area above this station is 136 square miles.

The gage is a vertical rod. No determined relation exists between this gage and the one at the old location.

As at the old location discharge measurements are made by wading.

Discharge measurements of West Divide Creek at Raven, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	W. B. Freeman	24	52	2.83	294
Mar. 15	Freeman and Vickery	29	22	1.60	25
May 18	W. B. Freeman	23.5	32	2.10	74
July 7	G. H. Russell	9.5	10	1.15	3.7
Sept. 3	....do			.80	*a*.3
26[b]	....do			1.15	*a*.75

a Discharge estimated. *b* New station at Ewer's ranch.

Daily gage height, in feet, of West Divide Creek at Raven, Colo., for 1910.

[Collins and Ewer, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.3	1.2	1.2	2.05	2.55	2.0	1.1			1.1	1.2	1.4
2	1.3	1.2	1.2	2.05	2.5	1.9	1.05			1.2	1.2	1.4
3	1.3	1.2	1.2	2.05	2.5	1.9	1.1			1.25	1.2	1.4
4	1.3	1.2	1.2	1.85	2.5	1.8	1.1			1.25	1.35	1.4
5	1.25	1.2	1.2	2.1	2.5	1.6	1.15			1.2	1.25	1.5
6	1.25	1.2	1.35	2.1	2.5	1.5	1.15			1.2	1.3	1.4
7	1.25	1.2	1.35	2.1	2.4	1.4	1.15			1.2	1.3	1.4
8	1.25	1.2	1.3	2.1	2.4	1.3	1.1			1.2	1.25	1.4
9	1.25	1.2	1.35	2.1	2.5	1.2	1.15			1.2	1.25	1.4
10	1.25	1.2	1.35	2.2	2.7	1.4	1.15			1.15	1.25	1.4
11	1.2	1.2	1.4	2.2	2.7	1.2	1.1			1.2	1.25	1.4
12	1.2	1.2	1.35	2.2	2.7	1.15	1.1			1.2	1.25	1.4
13	1.2	1.2	1.8	2.2	2.5	1.3	1.05			1.2	1.25	1.3
14	1.2	1.2	1.8	2.2	2.5	1.3	1.05			1.2	1.25	1.3
15	1.2	1.2	1.8	2.2	2.4	1.2	1.05			1.2	1.3	1.3
16	1.2	1.2	1.8	2.2	2.3	1.3	1.0			1.4	1.3	1.3
17	1.2	1.2	1.85	2.35	2.3	1.3	1.0			1.65	1.3	1.3
18	1.2	1.2	1.9	2.45	2.3	1.25	1.0			1.7	1.35	1.3
19	1.2	1.2	1.9	2.55	2.2	1.15	0.95			1.6	1.35	1.3
20	1.2	1.2	1.85	2.75	2.2	1.1	0.95		1.15	1.5	1.25	1.3
21	1.2	1.2	1.85	2.75	2.2	1.1	0.9		1.15	1.45	1.25	1.3
22	1.2	1.2	1.85	2.45	2.1	1.1	0.9		1.15	1.4	1.25	1.3
23	1.2	1.2	1.85	2.55	1.7	1.1	0.9		1.15	1.4	1.3	1.3
24	1.2	1.2	1.95	2.85	1.7	1.1	0.85		1.15	1.35	1.3	1.3
25	1.2	1.2	1.95	2.85	1.7	1.05	0.85		1.15	1.2	1.3	1.3
26	1.2	1.2	1.95	2.85	1.9	1.05	0.8		1.1	1.2	1.3	1.3
27	1.2	1.2	1.95	2.85	1.8	1.15	0.8		1.1	1.25	1.3	1.3
28	1.2	1.2	1.95	2.85	1.8	1.1	0.9		1.1	1.25	1.3	1.3
29	1.2		1.95	2.95	1.8	1.2	0.9		1.1	1.3	1.4	1.3
30	1.2		1.95	2.75	2.1	1.2	0.9		1.1	1.3	1.4	1.3
31	1.2		1.95		2.05					1.2		1.3

NOTE.—No record of any effect of ice. Gage heights beginning Sept. 20 not comparable to previous gage heights in 1910.

Daily discharge, in second-feet, of West Divide Creek at Raven, Colo., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	8.5	5.0	5.0	68	186	61	2.5	16	5.0	5.0	40	92	114	8.5	1.0
2	8.5	5.0	5.0	68	170	50	1.8	17	5.0	5.0	45	127	114	8.5	1.0
3	8.5	5.0	5.0	68	170	50	2.5	18	5.0	5.0	50	155	114	6.8	1.0
4	8.5	5.0	5.0	45	170	40	2.5	19	5.0	5.0	50	186	92	3.8	.8
5	6.8	5.0	5.0	74	170	25	3.8	20	5.0	5.0	45	200	92	2.5	.8
6	6.8	5.0	11	74	170	18	3.8	21	5.0	5.0	45	200	92	2.5	.6
7	6.8	5.0	11	74	140	13	3.8	22	5.0	5.0	45	155	74	2.5	.6
8	6.8	5.0	8.5	74	140	8.5	2.5	23	5.0	5.0	45	186	32	2.5	.6
9	6.8	5.0	11	74	170	5.0	3.8	24	5.0	5.0	56	302	32	2.5	.4
10	6.8	5.0	11	92	240	13	3.8	25	5.0	5.0	56	302	32	1.8	.4
11	5.0	5.0	13	92	240	5.0	2.5	26	5.0	5.0	56	302	50	1.8	.3
12	5.0	5.0	11	92	240	3.8	2.5	27	5.0	5.0	56	302	40	3.8	.3
13	5.0	5.0	40	92	170	8.5	1.8	28	5.0	5.0	56	302	40	2.5	.6
14	5.0	5.0	40	92	170	8.5	1.8	29	5.0	.....	56	344	40	5.0	.6
15	5.0	5.0	40	92	140	5.0	1.8	30	5.0	.....	56	200	74	5.0	.6
								31	5.0	.....	56	.....	68	.....	.6

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Estimates subsequent to July not available, as the new section has not been rated.

Monthly discharge of West Divide Creek at Raven, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	8.5	5.0	5.80	357	B.
February	5.0	5.0	5.00	278	B.
March	56	5.0	33.4	2,050	A.
April	344	45	157	9,340	A.
May	240	32	122	7,500	A.
June	61	1.8	12.5	744	A.
July	3.8	.3	1.66	102	B.
The period				20,400	

MAMM CREEK BASIN.

WEST MAMM CREEK NEAR RIFLE, COLO.

Mamm Creek, which enters Grand River from the south about 4 miles upstream from Rifle, Colo., is formed by the junction of West Mamm, East Mamm, and Middle Mamm creeks, all of which rise on the north side of Battlement Mesa.

The flow of this stream is supplied by melting snow in the spring and by rains. Its channel is usually dry or nearly so during the late summer and fall.

The gaging station was established July 26, 1909, and discontinued September 19, 1910. It was located just south of J. T. Selby's ranch house, 9 miles south of Rifle, Colo., about half a mile above the mouth of Quakenasp Gulch Creek, and three-fourths of a mile above the dam site of a proposed irrigation reservoir.

One ditch of less than 10 second-feet capacity diverts water above the station. The waste water from this ditch is returned to the creek a few feet above the staff gage.

From November 16, 1909 to March 6, 1910, a 24-inch trapezoidal sharp-edge weir, with end contractions, was used to measure the

flow of the stream. This weir is located about 50 feet downstream from the gage. Current-meter measurements were made at several sections in the vicinity of gage.

Ice exists to some extent for an extended period during the winter season. Conditions at this station are not conducive to the most accurate results, especially during the higher stages, when gage heights show great fluctuations and measurements are difficult to make.

Discharge measurements of West Mamm Creek near Rifle, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 15	Freeman and Vickery	7	1.9	0.60	2.9
Apr. 29	W. B. Freeman	6	2.3	.82	7.6
May 19	....do	2	.3	.70	.4
July 7	G. H. Russell	.....	.....	.....	[a] 1.0
Sept. 3	....do	1.4	.6	.40	.5
19	....do	1.15	.3	[b]	.53

[a] Discharge estimated. [b] Gage out of water.

Daily gage height, in feet, and discharge, in second-feet, of West Mamm Creek near Rifle, Colo., for 1910.

[J. T. Selby, observer.]

Day.	January.		February.		March.		April.		May.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.67	3.6	0.21	0.6	0.21	0.6	0.4	0.5	0.5	1.1
2	.33	1.3	.21	.6	.21	.6	.4	.5	.5	1.0
3	.21	.6	.21	.6	.21	.6	.4	.5	.6	2.0
4	.21	.6	.21	.6	.21	.6	.4	.5	.8	5.5
5	.21	.6	.21	.6	.21	.6	.4	.5	.8	5.0
6	.21	.6	.21	.6	.25	.8	.4	.5	.8	4.7
7	.21	.6	.21	.6	.5	1.4	.4	.5	.8	4.3
8	.21	.6	.21	.6	.6	2.9	.5	1.4	.9	6.2
9	.21	.6	.21	.6	.7	4.8	.4	.5	.9	5.8
10	.21	.6	.21	.6	.7	4.8	.4	.5	.7	1.8
11	.21	.6	.21	.6	.6	2.9	.4	.5	.8	3.2
12	.21	.6	.21	.6	.6	2.9	.4	.5	1.0	7.0
13	.21	.6	.21	.6	.6	2.9	.4	.5	1.2	11
14	.21	.6	.21	.6	.6	2.9	.4	.5	1.0	5.8
15	.21	.6	.21	.6	.7	4.8	.6	2.9	.8	1.7
16	.21	.6	.21	.6	.8	7.1	.6	2.9	.....	1.0
17	.21	.6	.21	.6	.8	7.1	.4	.5	.....	.8
18	.21	.6	.21	.6	.8	7.1	.6	2.9	.....	.6
19	.21	.6	.21	.6	.9	9.5	1.0	12	.7	.4
20	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
21	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
22	.21	.6	.21	.6	.9	9.5	.4	.5	.....	.....
23	.21	.6	.21	.6	.8	7.1	.4	.5	.....	.....
24	.21	.6	.21	.6	.8	7.1	.5	1.4	.....	.....
25	.21	.6	.21	.6	.5	1.4	.5	1.4	.....	.....
26	.21	.6	.21	.6	.5	1.4	.7	4.8	.....	.....
27	.21	.6	.21	.6	.5	1.4	.7	4.8	.....	.....
28	.21	.6	.21	.6	.5	1.4	.....	11.4	.....	.....
29	.25	.8	.....	.....	.4	.5	1.35	18	.....	.....
30	.25	.8	.....	.....	.5	1.4	.9	9.5	.....	.....
31	.25	.8	.....	.....	.6	2.9	.....	.....	.....	.....

NOTE.—Gage heights Jan. 1 to Mar. 6 represent heads on the weir. Regulation rod gage used Mar. 7 to May 19. Gage not read after May 19. Daily discharge Jan 1–Mar. 6 computed from the weir formula $Q=3.33LH^{\frac{3}{2}}$. (See Water-Supply Paper 200, p. 162.) Discharge Mar. 7 to Apr. 29 obtained from gage heights and a curve which is fairly well defined. Indirect method for shifting channel was used Apr. 30 to May 19.

Monthly discharge of West Mamm Creek near Rifle, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3.6	0.6	0.74	45	A.
February	.6	.6	.60	33	A.
March	9.5	.5	3.81	234	B.
April	18	.5	2.75	164	B.
May 1–19	11	.4	3.63	133	C.

GUNNISON RIVER BASIN.

GENERAL FEATURES.

Gunnison River is formed in Gunnison County, Colo., by East and Taylor rivers, two streams that rise among the snow-covered peaks and on the slopes of the Continental Divide in the northeastern part of the county, descend through narrow mountain valleys, and unite about 12 miles above Gunnison. From the junction of these rivers the Gunnison flows west and southwest to the point where it enters Grand River at Grand Junction, in the central part of Mesa County, Colo.

The upper course of the river lies through a broad, mountainous valley, but near the mouth of Lake Fork the valley narrows and the river enters Black Canyon of the Gunnison, through which it winds in a tortuous course for 56 miles between granite walls that rise precipitously 3,000 feet above the water's edge. A short distance below the mouth of North Fork, the largest tributary of the river, the canyon walls break abruptly, and the stream enters a broad and fertile valley. Below Delta the river enters another canyon, with walls averaging 800 feet in height, and this continues irregularly to Grand Junction, only a few tracts of narrow bottom land lying between the channel and the canyon walls.

The soil of the lower valleys is chiefly adobe, and the higher mesas contain much gravel and sand. Groves of quaking aspen interspersed with large, open grazing plots cover broad areas of this plateau region. On the top of the Grand Mesa are forests of pine and aspen, and along the foothills grow piñon and cedar. In the valleys chico and sagebrush form the principal vegetation, except along the streams, which are bordered in places by cottonwood, willow, and undergrowth.

The chief tributaries of the Gunnison are Ohio, Tomichi, Lake Fork, and Cimarron creeks, and Smith, North Fork, and Uncompahgre rivers, North Fork being the largest. All the tillable lands of the North Fork and its tributaries have been brought under cultivation, and irrigation is practiced to such an extent that the entire flow is needed for existing systems. Ohio, Tomichi, Lake Fork, and Cimarron creeks are perennial streams, but almost their entire volume is

diverted for irrigation during the growing season, so that very little water reaches the Gunnison except at times of heavy storms or during spring floods.

Precipitation records for the Gunnison are meager. Those which exist show a range from 9 inches in the plateau region to about 25 inches in the mountains.

The run-off of the Gunnison drainage basin is conserved to a large extent by four national forests, which have a total area of about 5,700 square miles, of which approximately 3,800 square miles are located within the basin. About 65 per cent of this area is in standing timber, the remainder being classified as sagebrush, barren, and burned. Investigation of the headwaters of East River and other tributaries in Gunnison County several years ago discovered that many of the hills had been almost entirely denuded of their timber, a discovery to which may be attributed the setting aside of the areas as forests.

Along Gunnison River proper above the mouth of Lake Fork a number of ditches divert water for meadow irrigation, and irrigation is extensively practiced in the vicinity of Delta. The largest irrigated area in the Gunnison drainage basin is the Uncompahgre Valley. (See p. 150.)

The country is not adapted for large reservoirs, the meadows having so much fall and the valleys being so narrow that construction would be expensive in proportion to reservoir capacity. However, a large number of small reservoirs exist on the Gunnison and its tributaries, which can be advantageously utilized for power.

Power plants at present in operation in this basin develop about 2,200 horsepower, and there are many sites unutilized. The fall along some of the streams is heavy, ranging from 50 to 150 feet to the mile. Along the Uncompahgre, from its source to the 8,000-foot contour, the fall is almost 300 feet to the mile. At the present time the waters in this basin are being used for domestic purposes, irrigation, and power. By utilizing all the available storage it would theoretically be possible to develop about 200,000 horsepower. Along the South canal of the United States Reclamation Service, which receives the water from the Gunnison tunnel and carries it into Uncompahgre River, a series of drops will make possible the development of 5,000 to 10,000 horsepower.

Since 1903 the wettest year was 1909 and the driest 1904. By comparison with other drainage basins adjacent to the Gunnison, however, it is evident that 1902 was a drier year than 1904.

TAYLOR RIVER AT ALMONT, COLO.

This station, which is located at the wagon bridge at Almont, 100 yards above the confluence of Taylor and East rivers, in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, was established July 27, 1910, by the United States Reclamation Service.

The gage is a vertical rod spiked to the downstream side of the center pier.

Discharge measurements are made from downstream side of the bridge.

A station was maintained on Taylor River 14 miles above Almont from April 17 to November 24, 1905.

Discharge measurements of Taylor River at Almont, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 27	E. H. Swett	58	116	1.90	195
Sept. 29	do	62	110	1.78	150

Daily gage height, in feet, and discharge, in second-feet, of Taylor River at Almont, Colo., for 1910.

[J. K. McClanahan, observer.]

Day.	November.		December.		Day.	November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.75	140	1.6	100	16	1.65	112	1.6	100
2	1.75	140	1.6	100	17	1.65	112	1.6	100
3	1.75	140	1.6	100	18	1.65	112	1.6	100
4	1.75	140	1.6	100	19	1.6	100	1.6	100
5	1.75	140	1.6	100	20	1.6	100	1.7	125
6	1.75	140	1.6	100	21	1.6	100	1.7	125
7	1.75	140	1.6	100	22	1.7	125	1.7	125
8	1.75	140	1.6	100	23	1.7	125	1.7	125
9	1.75	140	1.7	125	24	1.7	125	1.7	125
10	1.75	140	1.7	125	25	1.7	125	1.7	125
11	1.75	140	1.7	125	26	1.7	125	1.7	125
12	1.7	125	1.7	125	27	1.7	125	1.7	125
13	1.7	125	1.7	125	28	1.7	125	1.7	125
14	1.7	125	1.6	100	29	1.65	112	1.6	100
15	1.7	125	1.6	100	30	1.65	112	1.6	100
					31			1.6	100

NOTE.—These discharges are obtained from a well-defined curve that is based on 1910 and 1911 discharge measurements. No notes in regard to ice.

Monthly discharge of Taylor River at Almont, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November	140	100	126	7,500	A.
December	125	100	111	6,820	A.

GUNNISON RIVER NEAR GUNNISON, COLO.

This station, which is located at the county bridge 2 miles below Gunnison and about 1½ miles above the mouth of Tomichi Creek, was established November 25, 1910.

A chain gage is fastened to the upstream side of the bridge.

Discharge measurements at normal stages are made by wading above the bridge; high-stage measurements are made from the upstream side of the bridge, which makes an angle with the current.

Water is diverted at points both above and below the station.

The gage heights are furnished through the courtesy of Mrs. C. W. Chinery.

The following discharge measurement was made by G. H. Russell:

Nov. 21, 1910: Width 124 feet, area 204 square feet; discharge 219 second-feet.

Daily gage height, in feet, of Gunnison River near Gunnison, Colo., for 1910.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				0.5	16				0.5
2				.5	17				.3
3				.6	18				.3
4				.5	19				.4
5				.4	20	1.15			.5
6				.3	21				.6
7				.5	22				.5
8				.6	23				.4
9				.7	24				.6
10				.7	25			0.5	.5
11				.7	26			.4	.6
12				.7	27			.5	.7
13				.5	28			.4	.7
14				.4	29			.6	.5
15				.6	30			.5	.6
					31				.5

GUNNISON RIVER AT RIVER PORTAL, COLO.[1]

This station, which is located about 300 feet above the portal of the Gunnison tunnel, about 21 miles northeast of Montrose, about 8 miles below the mouth of Crystal Creek, and above North Fork and Uncompahgre River, was established April 7, 1905, replacing the station at Cimarron, about 12 miles above.

A number of small ditches divert water for meadow irrigation above the station. The largest diversion along the river, and also in Colorado, is the recently completed Gunnison tunnel, with a capacity of about 1,300 second-feet, which diverts the water from the Gunnison into the Uncompahgre Valley.[2]

The original staff gage, which was bolted to the cliff on the right bank of the river, was dislodged by driftwood on June 4, 1909. Prior to this date no change occurred in the location or datum of this gage. From June 5 to 19 an old high-water gage, about 100 feet upstream on the left bank, was read. The datum of this gage is 10.08 feet lower than that of the original gage. The readings were reduced to the original datum. This auxiliary gage could not be used after June 19, as the water surface had fallen too low. On

[1] This station was referred to in previous reports as "at east portal of Gunnison tunnel."

[2] The Gunnison tunnel and Uncompahgre project are described in the reports of the United States Reclamation Service.

August 9, 1909, a new staff gage was installed at the same location and datum as the original gage. This gage was broken off by ice November 20, 1909, and reestablished at same location and datum March 16, 1910.

Discharge measurements were made from a cable a few feet downstream from the original gage site.

Ice covers the river about four months each year, attaining a thickness of 1 to 2 feet. No winter records of discharge have been obtained.

This station is maintained under the supervision of the United States Reclamation Service. Computations of discharge have been made by engineers of the United States Geological Survey.

Discharge measurements of Gunnison River at River Portal, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 25	Swett and Moser	200	1,510	10.55	5,900
June 4	....do	210	1,840	12.40	9,320
July 8	Moser and Bryan	149	744	6.40	1,100
Aug. 11	Moser and Bunter	148	710	6.30	1,050
Oct. 5	E. H. Swett	147	568	5.32	587

Daily gage height, in feet, of Gunnison River at River Portal, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	7.3	11.1	12.85	7.8	6.8	5.7	5.35	5.4
2	.....	7.6	10.75	12.65	7.7	6.6	5.7	5.35	5.4
3	.....	7.5	10.4	12.85	7.6	6.5	5.7	5.45	5.45
4	.....	7.5	10.15	12.4	7.6	6.35	6.0	5.4	5.55
5	.....	7.2	10.3	12.15	7.6	6.6	6.1	5.35	5.7
6	.....	7.5	10.2	11.6	7.55	6.9	6.05	5.3	5.55
7	.....	7.5	10.05	11.45	7.4	6.65	5.9	5.3	5.45
8	.....	7.7	10.0	11.2	7.25	6.4	5.7	5.25	5.4
9	.....	7.8	.....	10.85	7.1	6.3	5.55	5.2	5.35
10	.....	8.1	11.55	10.5	6.95	6.35	5.5	5.2	5.4
11	.....	8.5	12.1	10.35	6.8	6.25	5.4	5.2	5.4
12	.....	8.7	12.4	10.35	6.75	6.7	5.4	5.2	.....
13	.....	8.7	11.95	10.35	6.6	7.0	5.55	5.2	.....
14	.....	8.6	11.95	10.25	6.6	6.75	5.7	5.2	.....
15	.....	8.25	11.7	9.9	6.5	6.6	5.7	5.3	.....
16	7.0	7.9	10.95	9.95	6.5	6.4	5.6	5.4	.....
17	7.2	8.0	10.45	9.65	6.55	6.3	5.6	5.9	.....
18	7.4	8.1	10.15	9.3	6.55	6.2	5.6	6.1	.....
19	7.9	8.45	10.0	9.25	6.55	6.1	5.6	5.9	.....
20	8.2	9.05	10.0	9.25	6.6	6.1	5.6	5.9	.....
21	8.7	9.5	10.05	9.1	6.4	6.1	5.6	5.6	.....
22	8.9	9.2	9.85	9.0	6.35	6.05	5.7	5.45	.....
23	9.4	9.15	9.55	8.75	6.3	6.0	5.6	5.6	.....
24	9 2	9 55	9.3	8.6	6.2	6.0	5.5	5.6	.....
25	8.9	10.35	9.45	8.35	6.1	5.9	5.45	5 6	.....
26	8.7	11.0	9.65	8.15	6.0	5.85	5.45	5.6	.....
27	8.2	11.25	10.0	8.2	5.95	5.7	5.45	5.6	.....
28	7.9	11.8	10.7	8.1	6.2	5.7	5.4	5.5	.....
29	7.7	12.0	12.0	8.1	6.2	5.85	5.4	5.4	.....
30	7.2	11.8	12.6	7.95	6.4	5.8	5.4	5.4	.....
31	7.2	.....	12.9	.....	.....	5.7	.....	5.4	.....

Daily discharge, in second-feet, of Gunnison River at River Portal, Colo., for 1910.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	1,820	6,840	9,900	2,300	1,400	710	560	580
2	.....	2,100	6,240	9,550	2,200	1,260	710	560	580
3	.....	2,010	5,660	9,900	2,100	1,180	710	600	600
4	.....	2,010	5,270	9,110	2,100	1,080	865	580	642
5	.....	1,740	5,500	8,670	2,100	1,260	925	560	710
6	.....	2,010	5,340	7,710	2,060	1,480	895	540	642
7	.....	2,010	5,120	7,450	1,920	1,290	810	540	600
8	.....	2,200	5,040	7,010	1,780	1,120	710	522	580
9	.....	2,300	6,330	6,400	1,650	1,050	642	505	560
10	.....	2,620	7,620	5,820	1,520	1,080	620	505	580
11	.....	3,070	8,580	5,580	1,400	1,020	580	505	580
12	.....	3,300	9,110	5,580	1,370	1,330	580	505	.....
13	.....	3,300	8,320	5,580	1,260	1,560	642	505	.....
14	.....	3,180	8,320	5,420	1,260	1,370	710	505	.....
15	.....	2,780	7,880	4,890	1,180	1,260	710	540	.....
16	1,560	2,410	6,580	4,960	1,180	1,120	665	580	.....
17	1,740	2,520	5,740	4,530	1,220	1,050	665	810	.....
18	1,920	2,620	5,270	4,050	1,220	985	665	925	.....
19	2,410	3,010	5,040	3,980	1,220	925	665	810	.....
20	2,730	3,730	5,040	3,980	1,260	925	665	810	.....
21	3,300	4,320	5,120	3,790	1,120	925	665	665	.....
22	3,540	3,920	4,820	3,660	1,080	895	710	600	.....
23	4,180	3,860	4,390	3,360	1,050	865	665	665	.....
24	3,920	4,390	4,050	3,180	985	865	620	665	.....
25	3,540	5,580	4,250	2,900	925	810	600	665	.....
26	3,300	6,660	4,530	2,680	865	785	600	665	.....
27	2,730	7,100	5,040	2,730	838	710	600	665	.....
28	2,410	8,060	6,150	2,620	985	710	580	620	.....
29	2,200	8,410	8,410	2,620	985	785	580	580	.....
30	1,740	8,060	9,460	2,460	1,120	760	580	580	.....
31	1,740	.....	9,980	.....	1,260	710	.....	580	.....

NOTE.—Daily discharge determined from a curve fairly well defined throughout.

Monthly discharge of Gunnison River at River Portal, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet.)	Accuracy.
	Maximum.	Minimum.	Mean.		
March 16-31	4,180	1,560	2,680	85,100	B.
April	8,410	1,740	3,700	220,000	B.
May	9,980	4,050	6,290	387,000	B.
June	9,900	2,460	5,340	318,000	B.
July	2,300	838	1,400	86,100	B.
August	1,560	710	1,050	64,600	B.
September	925	580	678	40,300	B.
October	925	505	610	37,500	B.
November 1-11	710	560	605	13,200	B.
The period	.....	.....	.....	1,250,000	

EAST RIVER AT ALMONT, COLO.

This station, which is located at the wagon bridge 200 feet above the mouth of the river at Almont, in sec. 22, T. 51 N., R. 1 E., New Mexico principal meridian, was established July 27, 1910, by the United States Reclamation Service.

The gage is a vertical rod spiked to the downstream side of the center pier.

Discharge measurements are made from the bridge.

From April 8 to October 8, 1905, a station was maintained at the same point as the present station, but the results at the two stations are not comparable, as the datums of the two gages were not the same.

Discharge measurements of East River at Almont, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 27	E. H. Swett	72	87	1.20	153
Sept. 29	do	50	64	.90	87
Nov. 24	G. H. Russell	50	46	.90	93

Daily gage height, in feet, of East River at Almont, Colo., for 1910.

[J. K. McClanahan, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	0.9	0.7	11	0.85	0.8	21	0.7	0.8
2	.85	.7	12	.8	.8	22	.75	.8
4	.85	.7	13	.8	.8	23	.8	.8
4	.85	.7	14	.8	.7	24	.9	.8
5	.85	.7	15	.8	.7	25	.9	.8
6	.85	.7	16	.75	.7	26	.85	.8
7	.85	.7	17	.75	.7	27	.85	.8
8	.85	.7	18	.75	.7	28	.8	.8
9	.85	.8	19	.7	.7	29	.8	.7
10	.85	.8	20	.7	.7	30	.75	.7
						31		.7

CEMENT CREEK NEAR CRESTED BUTTE, COLO.

This station, which is located 200 feet south of R. Ahrne's ranch house, 1¼ miles above the mouth of the creek, 1½ miles northeast of Glaciers Landing, a flag station on the Colorado & Southern Railway, and about 7 miles southeast of Crested Butte, the nearest post office, was established November 23, 1910. The station is 8,200 feet above sea level.

The gage is a vertical rod nailed to an 8-inch pine tree on the right bank.

Discharge measurements are made by wading at various sections, except at extreme high water, when they may be made from a foot bridge a short distance above the gage.

Inflow from a warm spring a short distance above the station tends to keep the channel open. Opportunity is thus afforded for accurate determination of winter run-off.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. H. Russell:

November 23, 1910: Width, 19.5 feet; area, 20 square feet; gage height, 0.36 feet; discharge, 17 second-feet.

The following gage heights have been observed:

November 23, 0.4, November 24–26, 0.3, November 27, 0.4, December 1–31, 0.3.

TOMICHI CREEK NEAR GUNNISON, COLO.

This station, which is located at a highway bridge about 1½ miles south of Gunnison and about 1¼ miles above the mouth of the creek, was established November 25, 1910.

A vertical rod gage is spiked to the downstream end of the left abutment of the bridge.

Discharge measurements at high stages are made from the bridge, which makes an angle with the current; at normal stages measurements are made by wading at various sections.

The stream bed is composed of small rocks and gravel and may shift somewhat.

Gage heights are furnished by the Forest Service.

The following discharge measurement was made by G. H. Russell:

November 25, 1910: Width, 34 feet, area, 92 square feet; gage height, 0.63 feet; discharge, 106 second-feet.

Daily gage height, in feet, of Tomichi Creek near Gunnison, Colo., for 1910

[B. A. Hartman, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		0.5	11			21		
2		.65	12			22		0.9
3		.6	13		0.7	23		
4		.6	14		.75	24		.9
5			15		.9	25	0.6	
6			16		.8	26	.6	
7		.6	17			27	.5	
8			18			28	.6	
9			19			29	.55	
10			20		.9	30	.6	
						31		

QUARTZ CREEK AT PITKIN, COLO.

This station, which is located at the second wagon bridge crossing the creek on the road from Pitkin to Gunnison, near the Colorado & Southern Railway tracks, was established December 12, 1910.

No water is diverted above this station and no tributaries enter below.

The gate is a vertical rod fastened to an abutment of the bridge.

Measurements can be made by wading at low stages and from the bridge at high stages.

No discharge measurements were made during 1910.

Gage heights are furnished by the Forest Service.

Daily gage height, in feet, of Quartz Creek at Pitkin, Colo., for 1910.

December 12	0.58	December 18	0.58
13	.58	19	.55
14	.60	20	.55
15	.60	21	.55
16	.58	22	.55
17	.60	23	.55

UNCOMPAHGRE RIVER BASIN.

GENERAL FEATURES.

Uncompahgre River, the principal tributary of the Gunnison from the south, rises among the snowy peaks of the highly serrated Uncompahgre Mountains and flows a little west of north to its junction with the Gunnison at Delta. The basin embraces a mountainous plateau and valley area of 1,130 square miles, oblong in shape, the width increasing slightly at the lower end. The mountain area occupies only a small part of the basin but contributes the perennial waters of the stream. The plateau area is greatest in extent and borders the valley on both sides, the larger Uncompahgre Plateau lying to the southwest. Escarpments are conspicuous features of this plateau. The relief features are terraced mesas flanked by buttes and ridges and trenched by deep, narrow canyons.

Uncompahgre Valley proper begins at a point near Eldredge siding, on the Denver & Rio Grande Railroad. In addition to the lands being irrigated by large private ditches, this valley contains about 150,000 acres, which are being reclaimed under the Uncompahgre project of the United States Reclamation Service. The greater part of the water for this land is diverted from Gunnison River by means of the Gunnison tunnel, which has a capacity of 1,300 second-feet. The construction of the tunnel was begun in January, 1905, and the actual opening through the tunnel was completed July 6, 1909. The present water rights consume the normal flow of Uncompahgre River, and the Uncompahgre Valley project will divert all the available water from Gunnison River during normal stages.

UNCOMPAHGRE RIVER AT AND NEAR FORT CRAWFORD.

A gaging station was established on Uncompahgre River at a highway bridge about half a mile west of Fort Crawford, in sec. 36, T. 48 N., R. 9 W., October 2, 1907, and discontinued October 31, 1910. On July 2, 1910, a station was established 2 miles below Fort Crawford on the north line of sec. 23, T. 48 N., R. 9 W., New Mexico principal meridian. The upper station was established to replace the station near Colona, which was maintained from August 10, 1903, to May 31, 1906.

The upper station is located just below the mouth of Horsefly Creek. A number of large irrigation ditches divert water above the station and existing power plants generate about 1,800 horsepower.

The rod gage which was established October 2, 1907, was washed out June 21, 1908. A temporary chain gage, the zero of which was placed 1.95 feet below the zero of the rod gage, was installed July 7, 1908. On July 23, 1908, a permanent rod gage was installed, the zero of which corresponded to 0.70 feet on the first rod gage and 2.65 feet

on the chain gage. During 1909 the chain gage established July 7, 1908, was read. In the early part of 1910 a new rod gage was established with a datum 3.20 feet lower than that of the chain gage. The readings for 1909 were reduced to this datum.

Thick ice forms along the edges of the river during the winter months. The channel remains open at the station, but the relation between gage height and discharge is at times affected by slush ice. The channel scours during high stages and silts during periods of low water.

The records derived from the observations at the upper station are rather poor.

At the lower station the gage is a vertical rod fastened to the upstream side of the single-span wooden highway bridge.

Discharge measurements are made from the bridge.

The record derived from the observations at the lower station is very good, as the stream bed at this point is permanent and sufficient measurements were made to enable the construction of a well-defined curve for the period from July 11 to October 31.

As the amount of water diverted daily between the upper and the lower stations during the period July 11 to October 31 is known, the discharge at the upper station for this period can probably be more accurately determined by adding the amount diverted to the flow at the lower station.

The following tables give the data for the upper and the lower stations, the diversions between, and the flow at the upper station as computed from the lower station flow plus diversions above.

Both stations have been maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River at Fort Crawford, Colo., in 1910.

[Upper station.]

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 23	E. H. Swett	61	95	1.98	480
May 5	do	62	115	2.30	521
17	do	60	116	2.00	442
June 2	do	62	202	2.85	[a] 1,240
16	R. H. Bolster	62	156	2.80	901
27	E. H. Swett	60	116	2.65	504
July 11	do	62	82	2.17	311
19	do	61	84	2.08	289

[a] A coefficient of 0.80 used to reduce from surface to mean velocity.

Daily gage height, in feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	2.45	3.0	2.45	2.55	2.4	2.1	16	.....	2.2	2.7	1.9	2.55	2.3	2.6
2	.....	2.4	2.85	2.55	2.5	2.4	2.0	17	.....	2.1	2.5	2.05	2.6	2.25	2.55
3	.....	2.4	.....	2.45	2.5	2.55	2.2	18	.....	2.05	2.5	2.0	2.6	2.25	2.45
4	.....	2.35	2.8	2.4	2.45	2.55	2.2	19	.....	1.95	2.95	2.05	2.5	2.25	2.45
5	.....	2.4	.....	2.4	2.75	2.45	2.15	20	2.0	1.95	2.95	2.25	2.6	2.25	2.4
6	.....	2.35	.....	2.5	2.85	2.4	2.2	21	.....	1.95	3.0	2.25	2.2	2.3	2.35
7	.....	2.3	.....	2.55	2.5	2.4	2.1	22	.....	2.1	2.9	2.35	2.1	2.4	2.4
8	.....	2.35	2.4	2.5	2.5	2.4	2.2	23	1.95	.....	2.85	2.3	2.05	2.3	2.45
9	.....	2.5	.....	2.4	2.55	2.3	2.2	24	.....	1.7	2.8	2.25	2.0	2.3	2.25
10	.....	2.6	2.2	2.3	2.1	2.3	2.2	25	.....	.....	2.7	2.2	2.45	2.3	2.05
11	.....	2.55	2.3	2.25	2.6	2.3	2.2	26	.....	.....	2.6	2.2	2.45	2.25	2.0
12	.....	2.65	2.3	2.05	2.85	2.3	2.2	27	.....	2.1	2.65	2.25	2.4	2.2	1.95
13	.....	2.7	2.4	1.95	2.7	2.35	2.2	28	.....	.....	2.65	2.35	2.4	2.2	1.9
14	.....	2.45	2.4	1.95	2.3	2.35	2.2	29	.....	.....	2.7	2.4	2.4	2.2	1.8
15	.....	2.35	2.9	1.9	2.3	2.3	2.2	30	2.65	.....	2.5	2.5	2.35	2.15	1.9
								31	.....	.....	.....	2.45	2.4	.....	1.9

Daily discharge, in second-feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	650	1,370	430	480	400	270	16	.....	550	825	210	480	355	505
2	.....	620	1,240	480	450	400	240	17	.....	500	680	260	505	330	480
3	.....	585	1,280	430	400	480	315	18	.....	465	680	240	505	330	430
4	.....	555	1,280	400	430	480	315	19	.....	415	940	260	450	330	430
5	.....	585	1,040	400	600	430	290	20	485	415	940	330	505	330	400
6	.....	555	950	450	660	400	315	21	485	440	900	330	315	355	380
7	.....	520	830	480	450	400	270	22	465	525	820	380	270	400	400
8	.....	555	750	450	450	400	315	23	465	415	700	355	255	355	430
9	.....	680	650	400	480	355	315	24	520	350	670	330	240	355	330
10	.....	750	585	355	270	355	315	25	580	420	540	315	430	355	255
11	.....	715	610	330	505	355	315	26	600	500	480	315	430	330	240
12	.....	825	610	260	660	355	315	27	670	585	510	330	400	315	225
13	.....	860	650	225	565	380	315	28	700	720	540	380	400	315	210
14	.....	880	650	225	355	380	315	29	765	870	565	400	400	315	175
15	.....	650	1,000	210	355	355	315	30	800	1,085	450	450	380	290	210
								31	.....	1,240	.....	430	400	.....	210

NOTE.—These discharges, Apr. 20 to June 30, obtained by indirect method for shifting channels. July 1 to Oct. 31, based on a curve that is fairly well defined.

Monthly discharge of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 20–30	800	465	594	13,000	C.
May	1,240	350	622	38,200	C.
June	1,370	450	791	47,100	D.
July	480	210	350	21,500	B.
August	660	240	435	26,700	C.
September	480	290	366	21,800	C.
October	505	175	318	19,600	C.
The period				188,000	

Discharge measurements of Uncompahgre River near Fort Crawford, Colo., in 1910.

[Lower station.]

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 23	E. H. Swett	45	95	3.31	372
27	do	45	68	2.68	212
July 2	do	45	80	3.00	270
11	do	45	62	2.58	182
Aug. 12	do	45	94	3.25	367
18	do	45	68	2.60	201
24	do	45	27	1.60	52
Sept. 14	do	45	52	2.30	149

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Fort Crawford, Colo., for 1910.

[Lower station; Frank Dolan, observer.]

Day.	July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	.....	.....	2.7	215	2.45	166	.....	95
2	.....	.....	2.6	195	2.45	166	.....	95
3	.....	.....	2.5	175	2.55	185	2.0	95
4	.....	.....	2.5	175	2.85	248	.....	90
5	.....	.....	2.9	260	.....	200	.....	90
6	.....	.....	3.25	360	2.45	166	1.95	88
7	.....	.....	.....	180	2.35	148	.....	90
8	.....	.....	2.65	205	2.4	156	1.95	88
9	.....	.....	2.75	225	2.2	122	.....	90
10	.....	.....	2.2	122	2.2	122	1.95	88
11	2.3	138	2.7	215	2.1	108	.....	90
12	2.5	175	3.25	360	2.05	102	.....	90
13	2.25	130	3.0	285	2.3	138	1.85	76
14	2.25	130	.....	83	2.3	138	1.85	76
15	.....	120	1.95	88	2.1	108	.....	80
16	2.65	205	2.55	185	2.1	108	.....	250
17	2.7	215	2.6	195	2.05	102	2.75	225
18	2.6	195	2.5	175	2.0	95	.....	180
19	.....	180	2.4	156	2.0	95	.....	180
20	2.6	195	2.3	138	2.05	102	2.4	156
21	2.55	185	2.8	235	2.1	108	2.2	122
22	2.4	156	2.6	195	2.3	138	.....	160
23	2.35	147	2.5	175	2.15	115	.....	200
24	2.15	115	1.6	51	2.2	122	.....	110
25	2.05	102	2.25	130	2.2	122	.....	70
26	.....	120	2.15	115	2.1	108	1.6	51
27	2.1	108	2.05	102	2.1	108	1.5	43
28	2.45	166	2.45	166	2.05	102	.....	40
29	2.5	175	2.5	175	2.05	102	.....	40
30	2.7	215	2.3	138	2.0	95	.....	40
31	.....	190	2.4	156	.....	.....	1.5	43

NOTE.—Daily discharge determined from a well-defined discharge rating curve. Discharge for days of missing gage heights computed from discharge at upper station less diversions.

Monthly discharge of Uncompahgre River near Fort Crawford, Colo., for 1910.

[Lower station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 11–31	215	102	160	6,660	A.
August	360	51	182	11,100	A.
September	248	95	130	7,740	B.
October	250	40	104	6,400	C.

Daily diversion from the Uncompahgre River between the Fort Crawford station and the station 2 miles below.

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1		240	183	180	16	50	228	204	180
2		230	183	175	17	49	248	203	174
3		229	183	172	18	50	253	203	170
4		241	195	170	19	84	256	204	170
5		288	201	170	20	124	260	203	160
6		258	208	173	21	148	127	216	150
7		240	203	160	22	214	90	202	150
8		222	200	150	23	228	79	192	150
9		223	197	160	24	227	123	203	140
10		175	206	177	25	228	250	192	130
11	218	232	204	170	26	212	253	192	125
12	142	256	204	170	27	229	251	192	127
13	121	266	204	174	28	229	184	191	140
14	132	257	204	173	29	229	188	192	100
15	132	198	205	170	30	232	182	192	120
					31	230	182		100

Monthly diversion from Uncompahgre River between the Fort Crawford station and the station 2 miles below.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
July 11–31	232	49	167	6,960
August	288	79	216	13,300
September	216	183	199	11,800
October	180	100	156	9,590

Daily discharge, in second-feet, of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station. Computed from record at lower station.]

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1		455	349	275	16	255	413	312	430
2		425	349	270	17	264	443	305	399
3		404	368	267	18	245	428	298	350
4		416	443	260	19	260	412	299	350
5		548	400	260	20	319	398	305	316
6		618	374	261	21	333	362	324	272
7		420	351	250	22	370	285	340	310
8		427	356	238	23	375	254	307	350
9		448	319	250	24	342	174	325	250
10		297	328	265	25	330	380	314	200
11	356	447	312	260	26	330	368	300	176
12	317	616	306	260	27	337	353	300	170
13	251	551	342	250	28	395	350	293	180
14	262	340	312	249	29	404	363	294	140
15	250	286	313	250	30	447	320	287	160
					31	420	338		143

NOTE.—Daily discharge determined by adding diversions between upper and lower stations to flow at lower station.

Monthly discharge of Uncompahgre River at Fort Crawford, Colo., for 1910.

[Upper station. Computed from record at lower station.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 11–31	447	245	327	13,600	A.
August	618	174	398	24,500	A.
September	443	287	328	19,500	A.
October	430	140	260	16,000	C.

UNCOMPAHGRE RIVER AT MONTROSE, COLO.

This station, which is located at the iron highway bridge just west of Montrose, one-quarter mile west of the Denver & Rio Grande Railroad, about 2 miles above Happy Canyon Creek and also above Cedar and Springs creeks, was established April 22, 1903.

Large irrigation ditches divert water between this station and that at Fort Crawford. The normal flow of this river is controlled for irrigation by existing water rights above the diversions, although opportunities exist for storage and power development. Established plants generate about 1,800 horsepower.

The staff gage, unchanged in location or datum during the maintenance of the station, is 20 feet upstream from the bridge.

Thick ice forms along the edges of the river in winter, but the channel usually remains open. The relation between gage height and discharge is at times affected by slush ice and anchor ice. The results obtained are good except for the winter periods and at times of extremely low water. The flow at this point will be affected by inflow of the South canal of the United States Reclamation Service.

The station is maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River at Montrose, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 27	E. H. Swett	50	105	4.35	486
May 7	do	30	55	2.88	122
14	do	41	74	3.69	296
18	do	30	47	2.75	79
June 1	do	78	163	5.30	962
18	do	31	71	3.50	295
18	R. H. Bolster	47	80	3.50	307
23	E. H. Swett	40	65	3.25	221
July 1	do	32	46	2.85	122
Aug. 15	do	31	31	2.34	38
24	do	25	30	2.12	23
Sept. 16	do	34	34	2.49	49

Daily gage height, in feet, of Uncompahgre River at Montrose, Colo., for 1910.

[Alfred Reeves, observer.]

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	3.55	3.75	5.58	2.55	2.8	2.65	2.05	16	2.88	3.05	4.1	2.7	2.94	2.48	3.2
2	3.58	3.3	5.4	2.45	2.75	2.7	2.3	17	3.25	2.82	3.5	2.85	2.95	2.48	3.68
3	3.65	2.9	5.32	2.6	2.8	2.75	2.46	18	3.2	2.68	3.65	2.85	2.78	2.2	3.4
4	3.2	2.82	5.45	2.4	2.62	3.08	2.32	19	3.1	2.5	4.15	2.93	2.65	2.25	3.45
5	3.1	4.25	5.2	2.95	3.45	2.82	2.25	20	3.72	2.4	3.65	2.86	2.45	2.42	3.32
6	3.65	3.95	5.22	2.9	3.32	2.79	2.2	21	3.72	2.4	3.5	2.76	2.36	2.53	3.4
7	3.3	3.85	5.0	2.92	2.85	2.68	2.25	22	3.38	2.45	3.5	2.74	2.50	2.5	3.5
8	3.4	3.78	5.1	2.95	2.9	2.70	2.34	23	3.4	2.2	3.4	2.59	2.55	2.45	3.45
9	3.28	3.58	5.35	2.85	2.8	2.62	2.36	24	3.35	2.0	3.22	2.39	1.98	2.35	3.35
10	3.25	4.6	5.32	2.68	2.9	2.52	2.35	25	3.72	2.0	3.05	4.05	2.02	2.32	3.25
11	3.48	4.6	4.75	2.6	3.25	2.4	2.34	26	3.68	2.4	3.0	4.02	1.42	2.35	2.53
12	3.4	4.6	4.8	2.55	4.0	2.35	2.42	27	3.6	3.5	2.9	1.62	2.15	2.42	2.4
13	3.55	3.8	4.75	2.38	3.38	2.65	2.4	28	4.5	3.65	2.75	2.8	2.5	2.38	2.35
14	3.4	3.75	4.48	2.4	3.15	2.55	2.38	29	4.55	5.15	2.75	2.82	2.65	2.13	2.35
15	2.95	4.3	4.2	2.32	2.4	2.52	2.5	30	4.15	5.45	2.7	2.88	2.48	2.05	2.3
								31	.....	5.5	.....	2.82	2.58	.....	2.3

Daily discharge, in second-feet, of Uncompahgre River at Montrose, Colo., for 1910.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	248	305	1,090	72	95	72	18	16	107	136	520	95	117	52	165
2	255	185	1,020	58	88	80	35	17	175	98	300	125	118	52	284
3	275	110	975	80	95	88	50	18	165	77	352	125	92	27	210
4	165	98	1,050	50	68	141	37	19	145	54	542	142	72	31	222
5	145	468	940	148	222	98	31	20	296	44	352	127	49	46	190
6	275	365	950	135	190	94	27	21	296	44	300	107	40	57	210
7	185	335	850	140	102	77	31	22	205	49	300	103	54	54	235
8	210	314	900	148	110	80	39	23	210	27	270	79	60	49	222
9	181	255	1,010	125	95	68	40	24	198	15	216	49	14	40	198
10	175	600	1,000	92	110	56	40	25	296	15	172	500	16	37	175
11	230	600	755	80	175	44	39	26	284	44	160	488	3	40	57
12	210	600	780	72	380	40	46	27	260	235	135	6	24	46	44
13	248	320	755	48	205	72	44	28	560	275	105	95	54	42	40
14	210	305	640	50	155	60	42	29	580	850	105	98	72	22	40
15	118	485	530	42	44	56	54	30	432	1,000	95	107	52	18	35
								31	.....	1,040	.....	98	63	.....	35

NOTE.—Daily discharge determined as follows: Apr. 1 to May 28, June 16 to July 27, and Oct. 31, from a well-defined curve. May 29 to June 15, indirect method for shifting channels used.

Monthly discharge of Uncompahgre River at Montrose, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	580	107	245	14,600	A.
May	1,040	15	302	18,600	A.
June	1,090	95	572	34,000	B.
July	500	6	119	7,320	B.
August	380	3	97.9	6,020	A.
September	141	18	58.0	3,450	A.
October	284	18	94.7	5,820	A.
The period				89,800	

UNCOMPAHGRE RIVER NEAR DELTA, COLO.

This station, which is located on the second highway bridge 2 miles south of Delta, Colo., was originally established April 29, 1903, at a highway bridge one-fourth mile above the Denver & Rio Grande Railroad bridge. On November 17, 1903, it was removed to the railroad bridge one-fourth mile northwest of the depot at Delta. A vertical gage at this bridge was read until April 21, 1904, when an inclined gage was installed on the right bank near the bridge. This gage was read until November, 1906, when a staff gage was installed at the present site, but observations at this gage were not begun until April 21, 1907. It was washed out September 6, 1909, and reestablished April 19, 1910, approximately on the site of the old gage. The plotting of the 1910 discharge measurements indicates that the datum of the last gage is about 0.2 foot higher than that of the preceding gage. The relation between the datum of the last gage and the several earlier gages has not been determined, and the datum of the gage used from April 22, 1904, to November, 1906, differs from that of the previous gage.

The station is near the junction of the Uncompahgre with the Gunnison and is below all tributaries and diversions. At ordinary stages the flow of the river at this point is nearly all seepage water from the irrigation ditches above. During the irrigating season the ditches consume all the normal flow.

The relation between gage height and discharge is probably not materially affected by ice, as thick ice does not form except along the edges of the stream; slush ice frequently occurs.

Records derived from observations at this station are good except for periods of extreme low water.

The station is maintained under the supervision of the United States Reclamation Service.

Discharge measurements of Uncompahgre River near Delta, Colo., for 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 28	R. M. Adams	42	101	2.54	242
June 5	do	48	98	2.45	294
July 20	do	40	42.4	1.57	21.1
29	do	48	61.4	1.70	43.3
Aug. 20	do	48	108	2.80	356
Oct. 22	do	50	69	.....	109
1910.					
Apr. 29	E. H. Swett	55	143	3.55	623
May 21	do	48	56	1.80	51.2
June 18	Bolster and Swett	48.5	74	2.44	192
July 8	E. H. Swett	30	31.1	1.58	12.5
Aug. 25	do	30	33.4	1.61	13.7
Sept. 20	do	47.5	42	1.80	33.0

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Delta, Colo., for 1909 and 1910.

[Mrs. W. J. Lance, observer.]

Day.	April.		May.		June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1909.														
1	1.8	60	1.9	80	1.95	92	3.65	690	1.7	42	2.5	250	.....	.....
2	1.8	60	1.75	51	1.9	80	3.45	610	1.7	42	2.5	250	.....	.....
3	1.8	60	1.95	92	1.9	80	3.35	570	1.65	34	3.1	470	.....	.....
4	1.8	60	2.4	220	2.0	105	3.4	590	1.6	27	3.5	630	.....	.....
5	1.9	80	2.75	338	3.0	430	3.85	770	1.6	27	3.65	690	.....	.....
6	2.0	105	3.4	590	3.5	630	3.8	750	1.6	27	4.5	1,050	.....	.....
7	2.1	130	3.45	610	3.95	810	3.55	650	1.7	42	.....	.....	.....	.....
8	1.95	92	3.65	690	4.15	892	3.15	490	1.7	42	.....	.....	.....	.....
9	1.9	80	3.4	590	4.25	938	2.75	338	1.65	34	.....	.....	.....	.....
10	1.9	80	3.25	530	4.1	870	2.5	250	2.3	190	.....	.....	.....	.....
11	1.9	80	3.25	530	3.95	810	2.45	235	2.5	250	.....	.....	.....	.....
12	1.9	80	3.25	530	3.9	790	2.0	105	2.0	105	.....	.....	.....	.....
13	1.9	80	3.05	450	3.9	790	2.0	105	1.85	70	.....	.....	.....	.....
14	1.8	60	2.65	302	3.8	750	2.0	105	2.35	205	.....	.....	.....	.....
15	1.8	60	2.25	175	3.75	730	1.8	60	2.15	145	.....	.....	.....	.....
16	2.05	117	2.05	118	3.85	770	1.7	42	2.15	145	.....	.....	.....	.....
17	2.4	220	2.0	105	3.85	770	1.7	42	2.3	190	.....	.....	.....	.....
18	3.2	510	2.15	145	4.3	960	1.7	42	2.65	302	.....	.....	.....	.....
19	3.4	590	2.55	268	4.6	1,100	1.7	42	3.0	430	.....	.....	.....	.....
20	3.3	550	2.55	268	4.4	1,000	1.75	51	2.65	302	.....	.....	.....	.....
21	3.1	470	2.55	268	4.35	982	1.6	27	2.6	285	.....	.....	.....	.....
22	2.55	268	2.25	175	4.1	870	2.25	175	2.55	268	.....	.....	.....	.....
23	2.2	160	2.45	235	4.2	915	2.05	118	2.35	205	.....	.....	.....	.....
24	1.9	80	2.3	190	4.25	938	2.3	190	2.45	235	.....	.....	.....	.....
25	1.75	51	2.2	160	4.1	870	2.0	105	2.5	250	.....	.....	.....	.....
26	1.85	70	2.1	130	4.05	850	2.0	105	2.45	235	.....	.....	.....	.....
27	2.25	175	2.3	190	3.95	810	1.95	92	2.6	285	.....	.....	.....	.....
28	2.6	285	2.5	250	3.85	770	1.8	60	2.25	175	.....	.....	.....	.....
29	2.5	250	2.45	235	3.6	670	1.7	42	2.0	105	.....	.....	.....	.....
30	2.1	130	2.3	190	3.65	690	1.7	42	2.0	105	.....	.....	.....	.....
31	.....	.....	2.15	145	.....	.....	1.65	34	2.2	160	.....	.....	.....	.....
1910.														
1	.....	.....	3.4	565	3.95	770	1.7	23	1.65	19	1.6	15	1.8	35
2	.....	.....	3.2	485	3.8	700	1.6	15	1.85	44	1.6	15	1.8	35
3	.....	.....	2.75	318	3.6	620	1.65	19	1.7	23	1.6	15	1.8	35
4	.....	.....	2.6	265	3.7	660	1.6	15	1.65	19	1.8	35	1.8	35
5	.....	.....	2.55	248	3.7	660	1.6	15	1.65	19	1.85	44	1.8	35

Daily gage height, in feet, and discharge, in second-feet, of Uncompahgre River near Delta, Colo., for 1909 and 1910—Continued.

Day.	April.		May.		June.		July.		August.		September.		October.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1910.														
6			2.45	215	3.7	660	1.6	15	2.25	135	1.75	29	1.8	35
7			2.4	200	3.7	660	1.6	15	1.85	44	1.8	35	1.8	35
8			2.25	155	3.65	610	1.6	15	1.65	19	1.85	41	1.8	35
9			2.35	185	3.5	580	1.55	11	1.8	35	1.9	52	1.8	35
10			2.65	282	3.4	540	1.5	7	1.75	29	1.75	29	1.8	35
11			2.95	388	3.3	500	1.5	7	1.7	23	1.7	23	1.8	3
12			3.1	445	3.3	500	1.5	7	1.95	62	1.7	23	1.85	4
13			2.6	265	3.3	500	1.5	7	2.95	362	1.8	35	1.85	4
14			2.5	230	3.15	440	1.5	7	3.2	460	1.9	52	1.85	44
15			2.3	170	3.15	440	1.5	7	2.1	95	1.75	29	1.88	49
16			2.25	155	3.05	400	1.6	15	1.75	29	1.8	35	2.05	84
17			2.1	115	2.65	258	1.5	7	1.95	62	1.8	35	3.4	540
18			2.0	90	2.35	165	1.55	11	1.85	44	1.7	23	3.05	400
19			1.85	60	2.3	150	1.65	19	1.8	35	1.8	35	2.75	292
20			1.8	50	2.5	210	1.55	11	1.7	23	1.8	35	3.15	440
21			1.8	50	2.4	180	1.5	7	1.7	23	2.15	108	2.8	310
22			1.75	42	2.35	165	1.6	15	1.7	23	2.25	135	2.8	310
23			1.7	34	2.3	150	1.55	11	1.7	23	2.0	72	2.9	345
24			1.7	34	2.3	150	1.5	7	1.75	29	1.75	29	2.8	310
25			1.65	27	2.0	72	1.5	7	1.65	19	1.9	52	2.55	225
26			1.6	20	1.95	62	1.5	7	1.6	15	1.8	35	2.45	195
27			1.6	20	1.8	35	1.5	7	1.6	15	1.8	35	2.4	180
28			2.0	90	1.8	35	1.5	7	1.6	15	1.9	52	2.35	165
29			2.65	275	1.7	23	1.7	23	1.6	15	1.85	44	2.3	150
30			3.35	535	1.7	23	2.35	165	1.6	15	1.75	29	2.2	120
31			3.9	750			1.75	29	1.6	15			2.25	135

NOTE.—Daily discharge for 1909 determined from a fairly well-defined rating curve based on measurements in 1909 and 1910. Discharge May 1–28, 1910, obtained from a curve fairly well defined; May 29–June 15, indirect method for shifting channels used; June 16–Oct. 31, obtained from a well-defined curve.

Monthly discharge of Uncompahgre River near Delta, Colo., for 1909 and 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1909.					
April	590	51	170	10,100	B.
May	690	51	225	17,500	C.
June	1,100	80	725	43,100	C.
July	770	27	243	14,900	B.
August	430	27	160	9,840	B.
The period				95,400	
1910.					
May	750	20	218	13,400	B.
June	770	23	365	21,700	B.
July	165	7	17.2	1,060	B.
August	460	15	57.7	2,550	A.
September	135	15	41.0	2,440	A.
October	540	35	154	9,470	A.
The period				51,600	

DOLORES RIVER BASIN.

GENERAL FEATURES.

Dolores River rises in the La Plata and San Miguel mountains, whose highest peak, Mount Wilson, attains an elevation of over 14,000 feet above sea level. It flows southwestward about 50 miles, then almost due north for nearly 100 miles, then again westward, and enters Grand River about 15 miles west of the Colorado-Utah line. For the greater part of its course the river flows through deep canyons, and comparatively little irrigation is practiced along the stream itself. In the vicinity of Dolores, however, the valley broadens, and for about 40 miles has a width of half a mile to a mile. A considerable part of this area is cultivated. In Paradox Valley, also, considerable land is cultivated, chiefly from small tributaries running into the main stream. By far the greater part of the Dolores River water is used for irrigation in the San Juan drainage basin, to which it is diverted by means of a tunnel and a great cut into the Montezuma Valley.

San Miguel River, the most important tributary of the Dolores, which drains an area immediately west of the headwaters of the Uncompahgre River, rises in San Miguel County, Colo., and enters the Dolores about 12 miles east of the Colorado-Utah line, at an elevation of about 5,000 feet. In general the stream and its tributaries flow northeastward. Considerable land along the San Miguel is irrigated.

The mean annual run-off of Dolores River above the mouth of the San Miguel is about 400,000 acre-feet, and the San Miguel furnishes at least half that amount.

Probably 600 square miles of the Dolores River basin is covered with merchantable timber and as much more is woodland. The total area of this basin is about 4,500 square miles.

The basin contains several small storage reservoir sites, a few of which have been developed, both for power and irrigation.

The river has an average fall of over 20 feet to the mile throughout almost its entire course, and a great stretch of the San Miguel has an average fall of more than 50 feet to the mile. Several water-power plants are in operation along the upper San Miguel and its tributaries, the development aggregating nearly 10,000 horsepower, of which about 7,500 horsepower is developed at the Ames, Howard Fork, and Illium plants of the Telluride Power Co. One plant on Bridal Veil Creek is utilizing a head of 2,000 feet to develop 1,200 horsepower.

DOLORES RIVER AT DOLORES, COLO.

This station, which is located at the wagon bridge about a quarter of a mile southwest of Dolores depot and about half a mile above the original site, was established June 25, 1895, discontinued October 31,

1903, and was reestablished August 27, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is bolted to the bridge abutment, and a Bristol automatic gage was installed November, 1910. Both gages are referred to the same datum. The relation between the new gages and the gage at original section has not been determined.

The bed of stream consists of sand, cobbles, and some small bowlders, and is apparently permanent. At high stages the river may overflow the left bank.

Low-water measurements are made by wading; high-stage measurements are made from the bridge.

The relation between gage height and discharge is somewhat affected by ice during the winter months.

Discharge measurements of Dolores River at Dolores, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 27	Ferguson and Christiansen	44	54	2.35	76
Sept. 14	E. O. Christiansen	43	63	2.49	101
Nov. 1	Christiansen and Hezmalhalch	46	61	2.48	98

Daily gage height, in feet, and discharge, in second-feet, of Dolores River at Dolores, Colo., for 1910.

[Beulah B. Hughes, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.4	84	2.3	69	2.5	102	2.45	93
2			2.35	76	2.5	102	2.5	102	2.5	102
3			2.45	93	2.5	102	2.5	102	2.5	102
4			2.6	121	2.4	84	2.55	112	2.45	93
5			2.5	102	2.4	84	2.55	112	2.2	55
6			2.45	93	2.4	84	2.5	102	2.3	69
7			2.4	84	2.3	69	2.45	93	2.45	93
8			2.3	69	2.3	69	2.4	84	2.4	84
9			2.3	69	2.3	69	2.45	93	2.4	84
10			2.3	69	2.3	69	2.4	84	2.45	93
11			2.3	69	2.3	69	2.45	93	2.4	84
12			2.3	69	2.3	69	2.45	93	2.3	69
13			2.35	76	2.3	69	2.4	84	2.2	55
14			2.45	93	2.3	69	2.4	84	2.2	55
15			2.4	84	2.4	84	2.45	93	2.4	84
16			2.4	84	3.15	242	2.45	93	2.4	84
17			2.4	84	3.35	291	2.45	93	2.4	84
18			2.35	76	2.9	184	2.4	84	2.4	84
19			2.4	84	2.9	184	2.45	93	2.4	84
20			2.45	93	2.9	184	2.35	76	2.45	93
21			2.65	131	2.6	121	2.25	62	2.45	93
22			2.7	141	2.6	121	2.3	69	2.6	90
23			2.45	93	2.6	121	2.4	84	2.6	90
24			2.4	84	2.6	121	2.45	93	2.6	90
25			2.4	84	2.6	121	2.45	93	2.7	90
26			2.3	69	2.6	121	2.45	93	2.8	90
27	2.3	69	2.3	69	2.6	121	2.4	84	2.75	90
28	2.2	55	2.3	69	2.55	112	2.3	69	2.75	90
29	2.3	69	2.3	69	2.5	102	2.3	69	2.7	90
30	2.3	69	2.3	69	2.5	102	2.45	93	2.65	90
31	2.4	84			2.5	102			2.75	90

Monthly discharge of Dolores River at Dolores, Colo., for 1910.

[Drainage area, 524 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 27–31	84	55	69.2	0.132	0.03	686
September	141	69	85.0	.162	.18	5,060
October	291	69	113	.216	.25	6,960
November	112	62	89.4	.170	.19	5,320
December			85.1	.162	.19	5,230
The period						18,000

SAN MIGUEL RIVER AT FALL CREEK, COLO.

A gaging station was established on San Miguel River at Fall Creek, Colo., by the State engineer August 26, 1910, and was abandoned about a month later in favor of a site near Placerville, where the observations would indicate the run-off from the drainage areas of Leopard and Fall creeks, as well as that of the San Miguel.

The following discharge measurement was made by Christiansen and Ferguson:

August 26, 1910: Width, 30 feet; area, 41 square feet; gage height, 1.00 foot; discharge, 107 second-feet.

Daily gage height, in feet, of San Miguel River at Fall Creek, Colo., for 1910.

[C. W. Smith, observer.]

Day.	July.	Aug.	Day.	July.	Aug.	Day.	July.	Aug.
1		0.9	11		0.85	21		1.0
2		.95	12		.9	22		.95
3		1.3	13		1.15	23		.9
4		1.15	14		1.0	24		.9
5		1.05	15		.95	25		.8
6		1.0	16		.9	26	0.9	.8
7		.95	17		.9	27	.9	.8
8		.9	18		.9	28	1.0	
9		.85	19		.9	29	1.0	
10		.85	20		1.0	30	.95	
						31	.95	

SAN MIGUEL RIVER AT PLACERVILLE, COLO.

This station, which is located at the corduroy bridge three-fourths of a mile below Placerville, was established September 13, 1910, by the State engineer, by whom the records are furnished.

A vertical staff gage is fastened to the abutment of the bridge.

The channel consists of gravel and some bowlders and is fairly permanent, affording a very good measuring section.

Measurements are made from the lower side of the bridge or by wading at various sections.

The relation between gage height and discharge is affected by ice during the winter.

Discharge measurements of San Miguel River at Placerville, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	E. O. Christiansen	32	61	1.05	183
Oct. 30	Christiansen and Hezmalhalch	31	45	.60	95

Daily gage height, in feet, and discharge, in second-feet, of San Miguel River at Placerville, Colo., for 1910.

[John E. Stanguist, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.6	95	0.65	103	0.55	88
2			.75	120	.7	111	.5	80
3			.65	103	.7	111	.45	72
4			.7	111	.7	111	.5	80
5			.6	95	.65	103	.45	72
6			.6	95	.65	103	.5	80
7			.6	95	.65	103	.55	88
8			.6	95	.65	103	.5	80
9			.6	95	.65	103	.5	80
10			.6	95	.65	103	.5	80
11			.6	95	.65	103	.55	88
12			.6	95	.6	95	.5	80
13	1.0	171	.6	95	.6	95	.5	80
14	.85	140	.65	103	.6	95	.4	65
15	.85	140	.65	103	.6	95	.4	65
16	.8	130	1.3	245	.6	95	.4	65
17	.7	111	1.1	194	.55	88	.4	65
18	.8	130	.95	160	.6	95	.35	58
19	.75	120	.9	150	.6	95	.4	65
20	.85	140	.85	140	.55	88	.4	65
21	.85	140	.8	130	.55	88	.4	65
22	.8	130	.75	120	.55	88	.5	80
23	.75	120	.8	130	.6	95	.4	65
24	.7	111	.85	140	.6	95	.4	65
25	.7	111	.8	130	.55	88	.35	58
26	.65	103	.8	130	.55	88	.35	58
27	.7	111	.8	130	.5	80	.45	72
28	.65	103	.75	120	.4	65	.35	58
29	.6	95	.7	111	.5	80	.4	65
30	.6	95	.7	111	.5	80	.5	80
31			.7	111			.8	80

Monthly discharge of San Miguel River at Placerville, Colo., for 1910.

[Drainage area, 304 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 13–30	171	95	122	0.401	0.27	4,360
October	245	95	121	.398	.46	7,440
November	111	65	94.8	.312	.35	5,640
December	88	58	72.3	.238	.27	4,450
The period						

FREMONT RIVER BASIN.

GENERAL FEATURES.

Fremont River heads in the eastern slopes of the Wasatch Mountains in Sevier County, Utah, one of the sources being Fish Lake. It flows in a general southerly direction to Thurber, from which point it traverses the central portion of Wayne County in a general easterly direction to Hanksville, where it turns southward; it joins Colorado River about 8 miles above Hite, Utah. It receives one important tributary, Curtis Creek,[1] from the north and a number of smaller streams, including Tantalus and Lewis creeks, from the south. The lower half of its course is through two deep canyons separated by a valley. On the upper stretch of the main river is what is known as Rabbit Valley. Both Fremont River and Curtis Creek are considerably augmented in volume by springs in their canyons, but they derive the greater part of their waters from melting snows on the plateau.

FREMONT RIVER NEAR THURBER, UTAH.

This station, which is located about 2 miles (by road) south of Thurber, Utah, was established May 13, 1909.

Pine Creek enters about 2 miles above the station. This creek and springs in the valley just above the station furnish much of the low-water flow. Most of the normal low-water flow is diverted above and below the station for irrigation.

The staff gage is on the left bank about 2,000 feet above a gristmill. The gage-height records are probably not much affected by ice.

Discharge measurements are made from a cable at the gage during high stages, and by wading at low stages.

As the bed of the stream shifts somewhat, frequent measurements are necessary for reliable estimates of daily and monthly discharge.

Discharge measurements of Fremont River near Thurber, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	E. S. Fuller	29	29	4.82	80
Aug. 17	G. H. Canfield	31	36	4.95	68
17	do	28	25	4.93	65
Sept. 21	do	31	39	5.58	124
21	do	30	39	5.58	126
Oct. 14	do	33	35	5.33	89

[1] Called Muddy River on Land Office maps.

Daily gage height, in feet, of Fremont River near Thurber, Utah, for 1910.

[John Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.75	5.5	6.15	5.2	5.1	4.9	4.85	5.0	5.35	5.65	5.5	5.55
2	5.65	5.5	6.1	5.25	5.05	4.95	4.8	5.1	5.4	5.7	5.55	5.5
3	5.7	5.55	6.15	5.2	5.0	4.95	4.75	5.0	5.5	5.65	5.5	5.5
4	5.65	5.5	6.2	5.15	5.05	4.85	4.8	4.95	5.45	5.6	5.5	5.55
5	5.6	5.5	6.25	5.2	5.0	4.8	4.75	4.9	5.5	5.65	5.5	5.55
6	5.7	5.45	6.3	5.25	4.9	4.85	4.8	4.95	5.5	5.7	5.55	5.65
7	5.65	5.5	6.4	5.2	4.95	4.8	4.85	5.0	5.45	5.7	5.6	5.65
8	5.7	5.55	6.5	5.25	5.0	4.75	4.8	5.1	5.5	5.65	5.55	5.55
9	5.65	5.6	6.55	5.3	4.95	4.8	4.85	5.0	5.45	5.6	5.5	5.6
10	5.55	5.55	6.6	5.5	4.9	4.85	4.8	5.1	5.4	5.55	5.5	5.6
11	5.6	5.6	6.5	5.4	4.95	4.8	4.75	5.15	5.45	5.55	5.55	5.55
12	5.55	5.6	6.0	5.3	4.9	4.75	4.8	5.2	5.5	5.5	5.5	5.55
13	5.6	5.7	5.9	5.25	4.85	4.7	4.85	5.15	5.6	5.45	5.55	5.5
14	5.65	5.8	5.8	5.2	4.9	4.75	4.8	5.1	5.75	5.4	5.5	5.5
15	5.7	5.9	5.85	5.25	4.95	4.8	4.75	5.0	5.85	5.4	5.55	5.55
16	5.65	5.95	5.8	5.3	4.9	4.75	4.8	4.95	5.9	5.45	5.5	5.5
17	5.75	6.0	5.9	5.25	4.85	4.8	4.75	4.9	6.0	5.5	5.5	5.5
18	5.65	5.65	5.8	5.15	4.8	4.85	4.7	4.95	6.1	5.5	5.55	5.55
19	5.6	5.6	5.7	5.1	4.85	4.8	4.65	4.95	6.0	5.55	5.6	5.55
20	5.55	5.65	5.75	5.15	4.8	4.85	4.7	5.0	5.8	5.5	5.55	5.5
21	5.6	5.7	5.8	5.1	4.8	4.8	4.75	5.0	5.6	5.45	5.6	5.5
22	5.65	5.75	5.85	5.05	4.75	4.75	4.7	5.1	5.6	5.4	5.65	5.55
23	5.7	5.85	5.8	5.1	4.7	4.8	4.65	5.15	5.6	5.4	5.7	5.5
24	5.65	5.9	5.75	5.05	4.75	4.75	4.7	5.1	5.65	5.45	5.65	5.5
25	5.6	6.0	5.6	5.0	4.7	4.8	4.8	5.15	5.65	5.5	5.6	5.55
26	5.55	6.1	5.5	5.05	4.65	4.8	4.9	5.1	5.7	5.5	5.55	5.6
27	5.6	6.0	5.3	5.1	4.75	4.85	5.0	5.05	5.65	5.55	5.5	5.65
28	5.55	6.1	5.2	5.05	4.7	4.8	5.1	5.0	5.6	5.5	5.5	5.65
29	5.5	.....	5.15	5.15	4.75	4.75	5.0	5.1	5.65	5.5	5.55	5.6
30	5.45	.....	5.1	5.1	4.8	4.8	4.9	5.2	5.6	5.55	5.5	5.6
31	5.5	.....	5.15	.....	4.85	.....	4.95	5.3	.....	5.5	.....	5.65

Daily discharge, in second-feet, of Fremont River near Thurber, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	187	158	221	120	109	83	70	76	102	127	104	109
2	177	158	216	125	102	87	67	84	107	131	109	104
3	181	163	221	120	98	87	63	75	117	124	104	104
4	177	158	227	115	102	78	66	70	112	120	104	109
5	171	158	233	120	98	74	62	66	117	123	104	109
6	181	153	238	125	88	78	66	70	117	128	109	119
7	177	158	248	120	93	74	69	75	112	128	114	119
8	181	163	260	125	98	69	65	83	117	122	109	109
9	177	162	265	129	93	72	69	74	112	117	104	114
10	166	162	270	150	88	76	64	83	107	111	104	114
11	170	167	260	140	92	72	60	87	112	111	109	109
12	165	167	204	129	88	68	64	92	117	106	104	109
13	170	176	194	125	83	64	68	87	127	101	109	104
14	177	189	186	120	87	68	64	82	142	95	104	104
15	180	197	188	125	92	72	60	73	152	95	109	109
16	177	203	184	128	87	67	64	68	157	100	104	104
17	185	207	193	124	82	71	60	63	167	104	104	104
18	177	170	182	114	78	74	56	67	177	104	109	109
19	170	165	172	109	82	70	50	67	167	109	114	109
20	166	170	177	114	78	74	54	71	147	104	109	104
21	170	156	182	109	78	70	58	71	127	100	114	104
22	177	181	187	104	73	66	54	80	126	95	119	109
23	180	191	182	109	68	68	50	84	126	95	124	104
24	177	196	177	104	72	64	54	80	127	100	119	104
25	170	208	161	100	68	68	61	84	127	104	114	109
26	166	218	151	103	72	68	68	80	134	104	119	114
27	170	206	131	108	68	71	77	76	128	109	104	119
28	163	216	121	103	64	67	85	71	122	104	104	119
29	158	.....	117	111	71	63	77	80	128	104	109	114
30	153	.....	112	108	73	67	68	89	123	109	104	114
31	158	.....	116	.....	79	.....	71	98	.....	104	.....	119

NOTE.—Daily discharge determined by indirect method for shifting channels.

Monthly discharge of Fremont River near Thurber, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	187	153	173	10,600	C.
February	218	153	178	9,890	C.
March	270	112	193	11,900	C.
April	150	100	118	7,020	C.
May	109	64	84.0	5,160	C.
June	87	63	71.7	4,270	C.
July	85	50	64.0	3,940	C.
August	98	63	77.6	4,770	B.
September	177	102	128	7,620	B.
October	131	95	109	6,700	B.
November	124	104	109	6,490	B.
December	119	104	110	6,950	B.
The year	270	50	118	85,300	

MUDDY CREEK NEAR EMERY, UTAH.

Muddy Creek rises in the eastern slopes of the Wasatch Mountains in the extreme southern corner of San Pete County, and joins Curtis Creek about 8 miles below Emery, Utah. Curtis Creek flows southeasterly across Emery County and enters Fremont River near Hanksville, Utah.

The station, which is located at Jacobsen's ranch, about 7 miles above and northwest of the town of Emery, Utah, was originally established April 29, 1909.

The station is below all tributaries and above all diversions.

Prior to August 25, 1909, records were obtained by measuring down to the water surface from a reference point on a flume in which discharge measurements were made. A staff gage was installed at the same location and datum on August 25. During August great variations in discharge were caused by heavy rains which washed out the gage and so altered the section that the station had to be reestablished September 18 at a new site several hundred feet upstream. An inclined staff gage was installed at a different datum and a cable erected from which discharge measurements will be made.

Discharge measurements of Muddy Creek near Emery, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 23	G. H. Canfield	18	15	2.00	34
23	....do	18	15	2.00	34
Aug. 27	....do	18	10	1.45	20
Sept. 28	....do	16	8.4	1.51	17
Nov. 28	....do	16	7.4	1.50	18

Daily gage height, in feet, and discharge, in second-feet, of Muddy Creek near Emery, Utah, for 1910.

[R. Jacobsen, observer.]

Day.	July.		August.		September.		October.		November.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.9	48	1.4	12		18		18
2			1.95	53	1.35	10		18		18
3			1.9	48	3.0	190		18		18
4			1.85	44	1.4	12		18		18
5			1.9	48	1.4	12		18		18
6			1.85	44	1.35	10		18		18
7			1.8	39	1.4	12		18		18
8			1.7	31	1.4	12		18		18
9			1.7	31	1.4	12		18		18
10			1.65	28	1.4	12		18		18
11			1.6	24	1.5	18		18		18
12			1.6	24	1.4	12		18		18
13			1.5	18	3.0	190		18		18
14			1.45	15	2.5	120	1.5	18		18
15			1.5	18	2.6	134	3.5	265		18
16			1.5	18	1.7	31	1.5	18		18
17			1.4	12	1.6	24		18		18
18			1.4	12		18		18		18
19			1.4	12		18		18		18
20			1.5	18		18		18		18
21			1.5	18		18		18		18
22			1.5	18		18		18		18
23	2.0	33	1.4	12		18		18		18
24	2.0	33	1.5	18		18		18		18
25	2.0	33	1.5	18		18		18		18
26	1.9	26	1.5	18		18		18		18
27	1.9	26	1.5	18		18		18		18
28	1.95	30	1.4	12	1.5	18		18	1.5	18
29	4.0	340	1.4	12		18		18		18
30	2.0	58	1.4	12		18		18		18
31	1.95	53	1.4	12				18		

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve; discharge estimated for days of missing gage heights.

Monthly discharge of Muddy Creek near Emery, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July 23–31	340	26	70.2	1,250	C.
August	53	12	24.3	1,490	B.
September	190	10	35.2	2,090	B.
October	265	18	25.4	1,560	C.
November	18	18	18.0	1,070	C.

ESCALANTE RIVER BASIN.

ESCALANTE CREEK NEAR ESCALANTE, UTAH.

Escalante River rises in the southern part of Garfield County, Utah, under the walls forming the east face of the Table Cliff Plateau; flows first northeast, then east, and finally southeast, and enters the Colorado in Kane County about 12 miles above the mouth of the San Juan. The river is 90 miles long, and in the lower three-fourths of its

course sweeps through a narrow canyon whose vertical walls range in height from 900 to 1,200 feet, in places filling the whole space from wall to wall, in places winding from side to side in a flood plain of sand and shifting its position more or less with every freshet.

In the upper part of its course it is joined by several tributaries, all of which flow through close canyons.

The gaging station, which is located on Escalante Creek, one of the headwaters of Escalante River, at the head of the canyon, about 2 miles below the town of Escalante, Utah, was established August 5, 1909. The records show the total amount of water available for storage in an excellent reservoir site at this point.

The principal tributaries above are Birch Creek, entering about 6 miles upstream, and Pine Creek, which enters just above the station. Practically all the normal low-water flow is diverted above the station for irrigation in and near Escalante, the run-off at the station representing only the surplus water.

The first gage used was located about 20 feet below the mouth of Pine Creek. It was washed out by a severe flood August 31, which scoured out the bed of the creek about 3 feet and changed the location of the channel. From September 1 to November 12, 1909, records were kept of the depth of water at a point near the gage site. On November 13, 1909, a new gage was set 35 feet above the old one and the observer's readings for the intervening period referred to the new datum. The records for this period are only approximate. On September 16, 1910, a new gage was established, the datum of which is 1 foot lower than that of the old gage.

Estimates of winter discharge are very unreliable. The shifting of the stream bed makes accurate interpretation of the result difficult.

Discharge measurements of Escalante Creek near Escalante, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 14	E. S. Fuller	37	.....	2.85	122
Aug. 13	G. H. Canfield	25	18	1.79	50
Sept. 16	.....do	24	16	2.63	47
16	.....do	22	16	2.61	44
17	.....do	22	16	2.75	59
Oct. 17	.....do	24	14	2.68	36

Daily gage height, in feet, of Escalante Creek near Escalante, Utah, for 1910.

[D. C. Shurtz, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.05	.....	2.4	2.45	2.85	2.25	.....	2.0	3.4	.....	.....	1.55
2	.....	2.6	.....	.....	.....	.....	0.85	.....	.....	.....	1.4	.....
3	3.0	.....	2.9	2.6	2.8	2.15	.....	1.6	0.8	1.27	.....	1.7
4	.....	2.6	.....	.....	.....	.....	0.8	.....	.....	.....	1.2	.....
5	3.0	.....	2.95	.....	2.8	2.1	.....	1.4	0.7	.....	.....	1.4
6	.....	2.7	.....	2.5	.....	.....	0.7	.....	.....	1.25	1.2	.....
7	3.0	.....	3.0	.....	2.8	2.05	.....	1.6	0.6	.....	.....	1.35
8	.....	2.6	.....	2.5	.....	.....	0.7	.....	.....	1.25	1.2	.....
9	3.0	.....	2.95	.....	2.8	2.05	.....	1.8	0.6	.....	.....	1.3
10	.....	2.5	.....	2.6	.....	.....	0.75	.....	.....	2.2	1.2	.....
11	3.0	.....	2.95	.....	2.8	1.9	.....	1.6	1.4	.....	.....	1.4
12	.....	2.45	.....	2.1	2.85	.....	0.8	.....	.....	1.4	1.2	.....
13	3.0	2.5	2.9	.....	.....	1.85	.....	.....	.....	.....	.....	1.5
14	.....	.....	.....	2.0	2.85	.....	.....	1.8	3.2	1.60	1.2	1.6
15	3.0	2.6	2.8	.....	.....	1.7	0.85	.....	.....	.....	.....	.....
16	.....	.....	.....	1.9	2.7	.....	.....	1.7	1.6	.....	1.2	1.65
17	2.6	3.0	2.85	.....	.....	.....	0.6	.....	1.75	1.6	.....	.....
18	.....	.....	.....	1.9	2.6	1.45	.....	3.2	3.44	.....	1.2	1.65
19	2.6	3.1	2.9	.....	.....	.....	0.5	.....	1.8	1.4	.....	.....
20	.....	.....	.....	.....	2.6	0.95	.....	1.6	.....	.....	1.2	1.65
21	2.6	3.0	3.0	2.6	.....	.....	0.85	.....	.....	1.4	.....	.....
22	.....	.....	.....	.....	2.8	0.8	.....	1.8	.....	.....	1.2	1.75
23	2.6	3.0	3.0	2.6	.....	.....	1.2	.....	.....	1.4	.....	.....
24	.....	.....	.....	.....	2.45	0.45	.....	1.7	1.25	.....	1.3	1.7
25	2.6	2.9	3.1	2.6	.....	.....	2.65	.....	.....	1.4	.....	.....
26	.....	.....	.....	.....	2.35	0.7	3.2	1.6	.....	.....	1.3	.....
27	2.55	3.0	3.0	2.7	.....	.....	.....	.....	1.3	1.3	.....	1.8
28	.....	.....	.....	.....	2.3	0.8	2.55	0.8	.....	.....	1.7	1.65
29	2.5	.....	3.0	2.9	.....	.....	5.0	.....	1.25	1.2	.....	.....
30	.....	.....	.....	.....	2.25	0.85	2.65	0.8	1.25	.....	1.6	1.65
31	2.5	.....	2.9	.....	.....	.....	3.40	.....	.....	1.5	.....	.....

NOTE.—Gage heights Jan. 1–15 affected by ice. A new gage with datum 1 foot lower than that of the old gage was installed Sept. 16, 1910. All gage heights corrected to agree with readings on the old gage.

Daily discharge, in second-feet, of Escalante Creek near Escalante, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	86	.....	77	82	121	64	4	67	225	.....	.....	30
2	.....	96	.....	.....	.....	.....	3.5	.....	.....	.....	22	.....
3	86	.....	126	96	116	56	3	36	7	17	.....	38
4	.....	96	.....	.....	.....	.....	3	.....	.....	.....	14	.....
5	86	.....	131	.....	116	53	2	25	5	.....	.....	22
6	.....	106	.....	86	.....	.....	2	.....	.....	16	14	.....
7	86	.....	136	.....	116	50	2	36	3	.....	.....	20
8	.....	96	.....	86	.....	.....	2	.....	.....	16	14	.....
9	86	.....	131	.....	116	50	2	50	3	.....	.....	18
10	.....	86	.....	96	.....	.....	2.5	.....	.....	78	14	.....
11	86	.....	131	.....	116	40	2	36	32	.....	.....	22
12	.....	82	.....	53	121	.....	3	.....	.....	22	14	.....
13	86	86	126	.....	.....	38	3	.....	.....	.....	.....	37
14	.....	.....	.....	46	121	.....	3	50	210	32	14	32
15	86	96	116	.....	.....	30	3.5	.....	.....	.....	.....	.....
16	.....	.....	.....	40	106	.....	2	43	45	.....	14	35
17	96	136	121	.....	.....	.....	1	.....	58	32	.....	.....
18	.....	.....	.....	40	96	19	1	205	211	.....	14	35
19	96	147	126	.....	.....	1	0	.....	45	22	.....	.....
20	.....	.....	.....	.....	96	5	2	45	.....	.....	14	35
21	96	136	136	96	.....	.....	3.5	.....	.....	22	.....	.....
22	.....	.....	.....	.....	116	3	7	62	.....	.....	14	42
23	96	136	136	96	.....	.....	11	.....	.....	22	.....	.....
24	.....	.....	.....	.....	82	0	50	53	16	.....	18	38
25	96	126	147	96	.....	.....	101	.....	.....	22	.....	.....
26	.....	.....	.....	.....	72	2	158	45	.....	.....	18	.....
27	91	136	136	106	.....	.....	125	.....	18	18	.....	45
28	.....	.....	.....	.....	68	3	91	7	.....	.....	38	35
29	86	.....	136	126	.....	.....	385	.....	16	14	.....	.....
30	.....	.....	.....	.....	64	3.5	130	7	16	.....	32	35
31	86	.....	126	.....	.....	.....	227	.....	.....	27	.....	.....

NOTE.—Daily discharge determined by means of several parallel curves, each based on one to three measurements; none of the curves well defined. Discharge Jan. 1 to 15 estimated because of presence of ice.

Monthly discharge of Escalante Creek near Escalante, Utah, for 1910.

Month.	Mean discharge in second-feet.	Run-off (total in acre-feet).
January	89.4	5,500
February	112	6,220
March	127	7,810
April	81.8	4,870
May	103	6,330
June	27.8	1,650
July	43.1	2,650
August	51.1	3,140
September	60.6	3,610
October	25.7	1,580
November	17.9	1,070
December	31.8	1,960
The year	64.3	46,400

NOTE.—These estimates may be classed as C. The mean of discharges on days on which gage heights were observed has been taken as mean for the month, except during July, when discharges were interpolated for days when gage heights were missing.

SAN JUAN RIVER BASIN.

GENERAL FEATURES.

San Juan River rises among the snow masses that crown the high peaks of the San Juan Mountains in southwestern Colorado, flows southwestward into New Mexico, then swings to the west and northwest, passing from San Juan County, N. Mex., across the extreme southwestern corner of Colorado into San Juan County, Utah, in the southwestern part of which it unites with the Colorado.

For the first 75 miles of its course the San Juan is a typical mountain stream, but at Canyon Largo, N. Mex., where it turns westward, its character changes, and it occupies a broad, winding, sandy channel in an arid valley, bordered on each side by terraced mesas. Below the mouth of Mancos River the valley narrows, and the river bottom is bounded by abrupt bluffs, broken and cut by dry water channels, and merging farther on into the walls of a deep, narrow, box canyon, in which the river flows to its end.

The headwater areas are protected by fine forests of spruce and yellow pine and at lower elevations large areas of aspen. The lower basin is practically barren except for an extensive growth of sagebrush, scattered cedars, piñons, and range grasses.

The principal tributaries of the San Juan are Navajo, Piedra, Pine (Los Pinos), Florida, Animas, and La Plata rivers, the Animas being the most important.

Animas River rises in the region above Silverton, and drains portions of the Needle and La Plata mountains, the former being the most rugged of the Rocky Mountain ranges. The river flows southward to the Colorado-New Mexico line and thence southwestward to the point where it joins the San Juan at Farmington, N. Mex.

Most of the region above Durango is well timbered with pine, spruce, and aspen, but large areas consist of naked granite peaks. Immediately above and below Durango the valley broadens and is bordered by mesas and bluffs cut by narrow canyons and covered with sagebrush and scattered pines and piñons; along the stream channels cottonwoods predominate. The rocks of this region are chiefly of sedimentary origin. The soils of the lower valleys consist of sandy loam and are very fertile.

La Plata River rises in the La Plata Mountains, about 25 miles northwest of Durango, Colo., and flows southward to its point of junction with the San Juan. Its drainage basin is a narrow strip parallel to and adjoining the Animas basin. The upper portion of the basin is a well-watered and forest-clad mountain region which merges southward into an arid mesa, plateau, and canyon country. La Plata Valley proper is a narrow, shallow depression from Hesperus down, bounded on both sides by high, broken table-lands and deeply eroded mountains. The lower mountain slopes are covered with piñon, scrub oak, and cedar; the lower valleys support heavy growths of sagebrush and chico; the upper mountain slopes were at one time heavily timbered with spruce and yellow and white pine, but these forests have been largely removed by lumbermen.

The other tributaries of the San Juan need not here be described. Those mentioned are perennial streams, but much of their water is diverted for irrigation and never reaches the main river. In addition to the perennial streams are many intermittent creeks throughout New Mexico which contribute large volumes of water during heavy storms.

The altitudes in the San Juan basin range from over 13,000 feet in the highest mountains to between 6,000 and 7,000 feet at the Colorado-New Mexico line. The San Juan at the mouth of the Animas has an elevation of about 5,300 feet; at its junction with Colorado River the elevation is about 3,500 feet.

Most of the timbered land in the San Juan drainage basin is included in the San Juan National Forest, which contains nearly 2,000 square miles of merchantable timber, 100 square miles of woodland, 300 square miles of sagebrush, and 200 square miles of barren and burnt area.

In a small area in the high mountains the annual precipitation exceeds 25 inches, and over a considerable area the average exceeds 20 inches; but for the remainder of the area the average in Colorado seems to be about 15 inches, that in New Mexico about 10 inches, and in Utah about 15 inches.

Above an altitude of 7,500 feet the winters are severe and snowfalls are heavy; below an elevation of 6,000 feet the winters are comparatively open and mild. The upper mountain streams flow under a

thick ice cover, but in the more open country, in the vicinity of Aztec, it is rather unusual for the rivers to freeze over entirely, though much ice forms along the edges, and slush ice is often seen.

Much land along the valleys of San Juan, Animas, Pine (Los Pinos), Florida, and La Plata rivers and the smaller tributaries in Colorado is now under cultivation, and also a few thousand acres of valley land in New Mexico. Up to this time irrigation has largely been confined to the bottom land. The greatest opportunities for future development are in San Juan County, N. Mex., where exceptionally large areas, aggregating probably a million acres of fertile lands, are excellently adapted to irrigation. The rivers there are bordered by broad mesas and benches, sloping back for miles in many places and easily reached by irrigation canals, and the water supply is ample.

Numerous small lakes, high up in the mountains, tend to equalize the flow of some of the tributaries, and many large and small storage reservoir sites are available. Among others may be mentioned the Turley reservoir site, on San Juan River below the mouth of the Pine (Los Pinos), which has a storage capacity of about one and a half million acre-feet.

Excellent opportunities for power development are presented. Theoretically, with proper storage, it will be possible to develop nearly 300,000 horsepower. Falls of 100 to 300 feet per mile are common on the upper reaches of the stream. The San Juan has an average fall of about 13 feet to the mile from the mouth of the Piedra to the mouth of the Mancos, a distance of about 115 miles, while the fall above the mouth of the Piedra is very much greater. The Animas has a fall of over 70 feet to the mile from Silverton to Durango, a distance of about 40 miles, and from Durango to its mouth the average fall is over 20 feet to the mile. Present developments are practically limited to two power plants on Animas River, of 6,000 and 1,000 horsepower.

The largest deposits of lignite and bituminous and coking coal in the West are in this drainage area.

SAN JUAN RIVER AT ARBOLES, COLO.

This station, which is located about 1,000 feet west of Arboles station, was established August 21, 1910, by the State engineer of Colorado, by whom the records are furnished.

An inclined staff gage is bolted to a high rocky bank on right side of stream.

Measurements are made from car and cable during high water, and by wading at various sections during low water.

The bed of the stream consists of mud, gravel, and small bowlders, and shifts somewhat, but the measuring section is fair.

Relation between gage height and discharge is slightly affected by ice during the winter months.

A station was maintained at this point from June 19, 1895, to September 30, 1899, by the United States Geological Survey, but the relation between the datum of the present gage and that of the original gage has not been determined.

Discharge measurements of San Juan River at Arboles, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 21	Ferguson and Christiansen	122	155	1.50	196
Sept. 22	E. O. Christiansen	115.5	164	1.42	154

Daily gage height, in feet, and discharge, in second-feet, of San Juan River at Arboles, Colo., for 1910.

[L. E. Smack, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.4	145	1.1	58	1.5	195	1.2	82
2			1.4	145	1.1	58	1.4	145	1.2	82
3			1.45	170	1.1	58	1.4	145	1.2	82
4			1.45	170	1.4	145	1.4	145		
5			1.35	126	1.3	108	1.5	195		
6			1.4	145	1.2	82	1.45	170		
7			1.4	145	1.1	58	1.45	170		
8			1.35	126	1.05	50	1.4	145		
9			1.3	108	1.1	58	1.4	145		
10			1.3	108	1.1	58	1.4	145		
11			1.3	108	1.1	58	1.4	145		
12			1.25	95	1.1	58	1.4	145		
13			1.2	82	1.1	58	1.3	108		
14			1.25	95	1.1	58	1.3	108		
15			1.2	82	1.1	58	1.6	250		
16			1.2	82	1.65	284	1.45	170		
17			1.25	95	2.45	1,300	1.45	170		
18			1.25	95	2.0	600	1.4	145		
19			1.4	145	1.65	284	1.4	145		
20			1.5	195	1.65	284	1.4	145		
21	1.8	395	1.55	222	1.6	250	1.4	145		
22	1.5	195	1.5	195	1.55	222	1.35	126		
23	1.6	250	1.45	170	1.55	222	1.3	108		
24	1.6	250	1.3	108	1.5	195	1.3	108		
25	1.65	284	1.2	82	1.5	195	1.3	108		
26	1.5	195	1.2	82	1.5	195	1.4	145		
27	1.5	195	1.2	82	1.5	195	1.5	195		
28	1.35	126	1.2	82	1.45	170	1.5	195		
29	1.4	145	1.2	82	1.3	108	1.4	145		
30	1.4	145	1.1	58	1.3	108	1.4	145		
31	1.5	195			1.4	145				

Monthly discharge of San Juan River at Arboles, Colo., for 1910.

[Drainage area, 1,394 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 21–31	395	126	216	0.155	0.06	4,710
September	222	58	121	.087	.10	7,190
October	1,300	50	186	.133	.15	11,500
November	250	108	152	.109	.12	9,000

SAN JUAN RIVER AT BLANCO, N. MEX.

This station, which was located at a new suspension bridge crossing the San Juan at Blanco, about 4 miles below Turley post office, 16 miles southeast of the Denver & Rio Grande Railroad at Aztec, N. Mex., and about half a mile above the mouth of Canyon Largo, which carries large quantities of water only during floods, was established December 9, 1908, to take the place of the station at Turley (abandoned Nov. 30, 1908), and was discontinued October 31, 1910.

The suspension bridge and chain gage were washed out by a flood on September 6, 1909, and on September 29, 1909, a temporary staff gage was established about 30 feet upstream from site of the bridge and at a new datum. Discharge measurements after September 6, 1909, were taken at the suspension bridge at Bloomfield, about 11 miles downstream, where a wire gage was installed on September 28, 1909.

The flow of the river at Blanco and Bloomfield should be the same, except for the inflow of Canyon Largo.

Daily gage height, in feet, of San Juan River at Blanco, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	4.3	4.2	4.9	5.7	6.9	6.8	5.0	4.9	3.6	3.6
2	4.3	4.2	5.0	5.6	6.7	6.5	4.7	4.8	3.6	3.6
3	4.5	4.2	5.1	5.6	6.6	6.5	4.7	4.2	3.6	3.6
4	4.6	4.2	5.5	5.5	6.4	6.3	4.7	4.8	3.6	3.6
5	4.5	4.2	5.8	5.4	6.0	6.4	4.7	4.8	3.6	3.6
6	4.5	4.1	6.2	5.4	6.1	6.4	4.7	4.8	3.6	3.6
7	4.4	4.1	6.2	5.5	6.1	6.2	4.6	4.7	3.6	3.6
8	4.4	4.1	6.0	5.5	6.2	6.1	4.6	4.2	3.6	3.6
9	4.4	4.1	6.1	5.5	6.6	5.5	4.6	4.2	3.6	3.6
10	4.4	4.1	5.9	5.5	6.9	5.5	4.4	4.2	3.6	3.6
11	4.5	4.1	5.9	5.5	7.0	5.5	4.2	4.2	3.6	3.6
12	4.5	4.1	5.8	5.6	7.0	5.5	3.0	4.4	3.6	3.6
13	4.5	4.1	5.9	5.6	7.0	5.4	2.9	4.6	3.4	3.5
14	4.5	4.2	6.2	5.7	6.9	5.3	2.9	4.6	3.4	3.5
15	4.4	4.3	6.1	5.7	6.6	5.3	2.9	4.7	3.4	3.5
16	4.4	4.2	6.3	5.8	6.3	5.3	2.9	4.6	3.4	3.5
17	4.6	4.2	6.3	5.8	6.1	5.3	3.0	4.2	3.6	4.6
18	4.6	4.1	6.4	5.8	6.2	5.2	3.3	3.9	3.6	3.6
19	4.5	4.1	6.5	5.9	6.2	5.2	3.8	3.9	3.6	3.6
20	4.5	4.1	6.7	5.9	6.1	5.1	3.8	3.8	3.7	5.15

Daily gage height, in feet, of San Juan River at Blanco, N. Mex., for 1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
21	4.4	4.1	6.8	5.9	6.1	5.0	3.7	3.7	3.7	4.25
22	4.4	4.2	6.7	6.0	6.0	4.9	3.7	3.6	3.8	4.1
23	4.4	4.3	6.7	6.1	5.9	4.7	3.7	3.7	3.6	3.7
24	4.4	4.4	6.4	6.4	5.9	4.6	3.6	3.7	3.6	3.7
25	4.4	4.5	6.5	6.6	5.9	4.5	3.6	3.8	3.6	3.7
26	4.3	4.6	6.2	6.7	6.2	4.8	3.5	3.8	3.6	3.6
27	4.3	4.7	6.0	6.8	6.3	4.9	3.5	3.8	3.6	3.6
28	4.3	4.8	5.8	6.9	6.7	5.3	3.5	3.8	3.6	3.6
29	4.2	.....	5.7	7.0	6.8	5.6	3.6	3.7	3.6	3.6
30	4.2	.....	5.7	7.0	7.0	5.9	4.2	3.6	3.6	4.2
31	4.2	.....	5.7	.....	6.8	.....	4.9	3.6	.....	4.2

SAN JUAN RIVER NEAR BLOOMFIELD, N. MEX.

This station, which is located at the suspension bridge about 1½ miles below Bloomfield and about 11 miles below the station at Blanco, where bridge was destroyed by the flood of September 6, 1909, was established September 28, 1909.

A wire gage was installed, but records were very fragmentary until a Friez automatic gage, for a 10-foot stage, installed February 11, 1910, on a 16-inch pile on the right bank just above the suspension bridge, was put in operation April 3, 1910. No gage heights were observed during 1909.

Discharge measurements are made from the downstream side of the bridge.

Discharge measurements of San Juan River near Bloomfield, N. Mex., in 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 28	W. B. Freeman	238	300	3.90	1,100
Nov. 17	J. B. Stewart	160	135	2.90	435
1910.					
Feb. 9[a]	W. B. Freeman	239	157	3.42	441
Mar. 26	G. J. Lyon	267	658	5.35	4,270
May 30	G. H. Russell	264	860	5.65	5,870
30	....do	264	985	6.05	7,190
June 22	R. H. Bolster	151	330	3.80	1,490
Aug. 20	G. J. Lyon	180	258	3.65	642
24	V. L. Sullivan	159	157	3.15	344
Oct. 11	J. B. Stewart	102	91	2.95	190
22	Freeman and Turley	210	196	3.22	687
Dec. 8	C. B. Digby	178	124	3.20	259

[a] On this date the flow of Canyon Largo estimated as 12 second-feet.

Daily gage height, in feet, of San Juan River near Bloomfield, N. Mex., for 1910.

[E. Hevinga, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.05	.....	5.8	5.8	3.65	3.75	3.25	3.0	3.35	3.25
2	.....	6.35	.....	5.6	5.65	3.55	3.45	3.2	3.0	3.4	3.2
3	.....	.....	4.6	5.3	5.5	3.65	3.4	3.3	3.05	3.4	3.25
4	.....	.....	4.55	5.1	5.35	3.7	3.65	3.1	3.15	3.45	3.2
5	.....	.....	4.5	5.15	5.2	3.65	4.5	3.0	3.25	3.4	3.2
6	.....	.....	4.45	5.2	5.2	3.6	3.9	2.95	3.15	3.4	3.2
7	.....	5.4	4.45	5.15	5.1	3.6	3.8	2.9	3.15	3.35	3.2
8	3.4	5.35	4.45	5.25	5.0	3.5	3.5	2.85	3.1	3.35	3.15
9	3.42	5.9	4.5	5.5	4.9	3.4	3.3	2.8	3.05	3.3	3.15
10	.....	.....	4.6	5.75	4.85	3.35	3.55	2.8	3.0	3.3	3.25
11	3.35	.....	4.7	5.9	4.7	3.3	3.8	2.75	3.0	3.3	3.2
12	.....	.....	4.8	5.9	4.7	3.2	3.5	2.75	3.0	3.3	3.25
13	.....	.....	4.9	5.85	4.65	3.15	3.55	2.7	3.0	3.3	3.2
14	.....	5.55	5.1	5.75	4.5	3.2	3.4	2.8	3.0	3.3	3.2
15	.....	5.5	4.9	5.6	4.5	3.2	3.3	2.85	3.0	3.4	3.3
16	3.7	5.35	4.8	5.2	4.3	3.2	3.45	2.9	3.7	3.45	3.2
17	3.5	.....	4.7	4.8	4.25	3.1	3.5	2.95	5.1	3.4	3.15
18	.....	.....	4.7	4.7	4.1	3.05	3.45	3.1	4.1	3.4	3.15
19	.....	.....	4.8	4.7	4.0	3.0	3.4	3.1	4.0	3.4	3.15
20	.....	.....	5.0	4.7	4.0	3.0	3.4	3.2	4.1	3.4	3.15
21	3.45	5.8	5.3	4.6	3.9	2.95	3.25	3.2	3.7	3.4	3.2
22	.....	5.85	5.4	4.5	3.8	2.95	3.35	3.2	3.3	3.35	3.2
23	.....	5.45	5.3	4.4	3.7	2.9	3.2	3.2	3.3	3.35	3.25
24	.....	.....	5.4	4.3	3.7	3.0	3.2	3.2	3.4	3.4	3.2
25	5.4	.....	5.6	4.45	3.65	3.1	3.2	3.1	3.3	3.35	3.3
26	.....	.....	5.75	4.6	3.6	3.3	3.2	3.1	3.3	3.4	3.3
27	.....	.....	5.8	4.7	3.5	3.2	3.2	3.1	3.35	3.4	3.3
28	4.85	5.35	5.9	5.0	3.5	3.2	3.05	3.05	3.4	3.4	3.3
29	.....	5.05	6.05	5.4	3.7	3.1	3.0	3.05	3.4	3.35	3.2
30	.....	4.85	6.0	5.85	3.8	4.1	3.0	3.05	3.35	3.25	3.1
31	.....	.....	.....	5.9	.....	3.95	3.1	.....	3.35	.....	3.2

NOTE.—Readings during February and March are from the board gage on outside of float box of the automatic gage installed Feb. 11, 1910, except Feb. 8 and 9, which are from wire gage.

Daily discharge, in second-feet, of San Juan River near Bloomfield, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	580	500	3,300	.....	6,110	6,110	900	740	340	210	700	400
2	580	500	8,620	.....	5,300	5,500	770	478	310	210	760	360
3	760	500	.....	2,050	4,150	4,910	830	440	370	232	760	400
4	865	500	.....	1,940	3,460	4,340	870	645	255	283	800	360
5	760	500	.....	1,830	3,630	3,800	820	1,830	210	340	700	360
6	760	430	.....	1,740	3,800	3,800	750	900	190	283	700	360
7	670	430	4,520	1,740	3,630	3,460	750	790	170	283	660	360
8	670	440	4,340	1,740	3,980	3,140	650	515	152	255	660	282
9	670	441	6,520	1,830	4,910	3,000	570	370	135	232	600	282
10	670	.....	.....	2,050	5,900	2,900	520	558	135	210	600	340
11	760	405	.....	2,290	6,520	2,600	470	790	122	210	600	310
12	760	.....	.....	2,550	6,520	2,600	380	515	122	210	600	340
13	760	.....	.....	2,830	6,320	2,500	350	558	110	210	600	310
14	760	.....	5,100	3,460	5,900	2,200	370	440	135	210	600	310
15	670	.....	4,910	2,830	5,300	2,200	300	370	152	210	620	370
16	670	690	4,340	2,550	3,800	1,850	310	478	170	750	650	310
17	860	515	.....	2,290	2,550	1,650	255	515	190	4,000	620	282
18	860	.....	.....	2,290	2,290	1,550	232	478	255	1,600	620	282
19	760	.....	.....	2,550	2,290	1,470	210	440	255	1,500	620	282
20	760	.....	.....	3,140	2,290	1,570	210	440	310	1,900	620	282
21	670	478	6,110	4,150	2,050	1,550	190	340	310	1,300	620	310
22	670	4,520	6,320	4,520	1,830	1,490	190	405	310	760	550	310
23	670	.....	4,720	4,150	1,640	1,300	170	310	310	760	550	340
24	670	.....	.....	4,520	1,460	1,250	210	310	310	900	600	310
25	670	.....	.....	5,300	1,740	1,170	255	310	255	760	550	370

Daily discharge, in second-feet, of San Juan River near Bloomfield, N. Mex., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	580	.....	4,270	5,900	2,050	1,080	370	310	255	760	550	370
27	580	.....	.....	6,110	2,290	930	310	310	255	760	550	370
28	580	2,690	4,340	6,520	3,140	900	310	232	232	800	550	370
29	500	.....	3,300	7,180	4,520	1,100	255	210	232	800	480	310
30	500	.....	2,690	6,950	6,320	1,180	1,150	210	232	760	400	255
31	500	.....	.....	.....	6,520	.....	960	255	.....	760	.....	310

NOTE.—Daily discharge Jan. 1 to Feb. 7 determined by using the Blanco gage heights and a curve parallel to 1909 curve passing through measurement of Feb. 9, at Bloomfield, which was referred to gage at Blanco. Daily discharge Feb. 8 to June 8, July 16 to Oct. 15, and Dec. 8 to 31 determined from a curve which is fairly well defined. Discharge June 9 to July 15 and Oct. 15 to Dec. 8 obtained by indirect method for shifting channels.

Monthly discharge of San Juan River near Bloomfield, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	865	500	684	42,100	D.
February (15 days)	4,520	405	903	26,900	B.
March (15 days)	8,620	2,690	4,890	145,000	B.
April 3–30	7,180	1,740	3,460	192,000	B.
May	6,520	1,460	3,940	242,000	B.
June	6,110	900	2,440	145,000	C.
July	1,150	170	480	29,500	C.
August	1,830	210	500	30,700	B.
September	370	110	226	13,400	B.
October	4,000	210	724	44,500	C.
November	800	400	616	36,700	C.
December	400	255	329	20,200	C.
The period	.....	.....	.....	968,000	

PIEDRA RIVER AT ARBOLES, COLO.

This station, which is located about one-third mile west of Arboles station, Colo., was established August 21, 1910, by the State engineer of Colorado, by whom the records are furnished. A station was maintained at this point from June 19, 1895, to September 30, 1899, by the United States Geological Survey, but the relation between the datum of the original gage and that of the present gage has not been determined.

A standard chain gage is attached to lower side of railway bridge, and a vertical staff gage is fastened to the old cofferdam at the bridge abutment. Both gages are at the same datum.

The bed of the stream is composed of mud and gravel and is liable to shift during floods. The channel is fairly straight, and the section below the bridge affords fair conditions for measurements.

High-water stage measurements are made from the railroad bridge; low-stage measurements are made by wading below bridge.

The relation between gage height and discharge is slightly affected by ice during the winter.

Discharge measurements of Piedra River at Arboles, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 21	Christiansen and Ferguson	65	92	1.10	96
Sept. 21	E. O. Christiansen	64	112	1.04	90

Daily gage height, in feet, and discharge, in second-feet, of Piedra River at Arboles, Colo., for 1910.

[L. E. Smack, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.05	91	0.95	81	1.2	106	1.05	91
2			1.0	86	1.0	86	1.25	111	1.2	106
3			.95	81	1.0	86	1.25	111	1.0	86
4			1.0	86	1.15	101	1.3	116		
5			1.0	86	1.15	101	1.3	116		
6			.95	81	1.05	91	1.3	116		
7			1.0	86	1.0	86	1.3	116		
8			.95	81	1.0	86	1.25	111		
9			.9	76	1.0	86	1.2	106		
10			.9	76	1.0	86	1.2	106		
11			.85	72	1.0	86	1.2	106		
12			.8	67	1.0	86	1.2	106		
13			.8	67	1.0	86	1.2	106		
14			.8	67	1.0	86	1.2	106		
15			.8	67	1.0	86	1.4	126		
16			.8	67	1.55	142	1.35	121		
17			.9	76	2.5	245	1.45	132		
18			.9	76	2.0	191	1.4	126		
19			.95	81	2.0	191	1.35	121		
20			1.05	91	2.0	191	1.3	116		
21	1.1	96	1.05	91	1.55	142	1.3	116		
22	1.1	96	1.1	96	1.5	137	1.3	116		
23	1.15	101	1.25	111	1.5	137	1.25	111		
24	1.2	106	1.1	96	1.5	137	1.2	106		
25	1.45	132	1.1	96	1.5	137	1.2	106		
26	1.3	116	1.0	86	1.5	137	1.2	106		
27	1.1	96	1.0	86	1.5	137	1.2	106		
28	1.05	91	1.0	86	1.4	126	1.2	106		
29	1.05	91	1.0	86	1.35	121	1.2	106		
30	1.05	91	.9	76	1.3	116	1.05	91		
31	1.0	86			1.25	111				

Monthly discharge of Piedra River at Arboles, Colo., for 1910.

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
August 21-31	132	86	100	0.154	0.06	2,190
September	96	67	82.4	.126	.14	4,880
October	245	81	120	.185	.21	7,380
November	132	91	112	.172	.19	6,660

LOS PINOS RIVER NEAR IGNACIO, COLO.

This station, which is located at the steel wagon bridge at the Ignacio Indian agency, about 2 miles above Ignacio, Colo., was established August 31, 1910, by the State engineer of Colorado, by whom the records are furnished. The station maintained during 1899 and 1900 by the United States Geological Survey was probably a short distance below the present site. The old bridge to which gage was spiked has been washed out. The relation between the datum of the old gage and that of the present gage has not been determined.

A standard chain gage is attached to the bridge and an auxiliary slope gage is fastened to the left bank about 500 feet below the bridge. Both gages are referred to the same datum.

The bed is composed of mud, sand, and bowlders, and is somewhat shifting. At high stages the river overflows its banks. The measuring section at bridge is only fair.

High-water measurements are made from the bridge. Low-water measurements, however, are made by wading at various sections.

The relation between gage height and discharge is only slightly affected by ice during the winter months.

Discharge measurements of Los Pinos River near Ignacio, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 31	Christiansen and Ferguson	51	29	1.60	40
Sept. 20	E. O. Christiansen	48	41	1.70	54
Oct. 24	Christiansen and Hezmalhalch	56	77	2.35	160

Daily gage height, in feet, and discharge, in second-feet, of Los Pinos River near Ignacio, Colo., for 1910.

[Mrs. C. J. Warner, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	1.6	43	1.7	51	2.2	126	2.0	89
2	1.6	43	1.7	51	2.15	116	2.0	89
3	1.65	47	1.75	56	2.15	116	2.0	89
4	1.7	51	1.7	51	2.2	126	2.0	89
5	1.65	47	1.65	47	2.15	116	2.0	89
6	1.6	43	1.6	43	2.15	116	2.0	89
7	1.6	43	1.65	47	2.15	116	2.0	89
8	1.6	43	1.6	43	2.15	116	2.0	89
9	1.5	36	1.6	43	2.05	98	2.0	89
10	1.5	36	1.6	43	2.05	98	2.05	98
11	1.5	36	1.6	43	2.1	106	2.05	98
12	1.5	36	1.6	43	2.05	98	2.0	89
13	1.5	36	1.6	43	2.05	98	2.0	89
14	1.55	39	1.6	43	2.1	106	2.0	89
15	1.5	36	1.6	43	2.2	126	2.0	89
16	1.5	36	2.3	148	2.15	116	2.05	98
17	1.5	36	3.2	440	2.2	126	2.05	98
18	1.5	36	2.65	241	2.05	98	2.05	98
19	1.55	39	2.6	226	2.05	98	2.0	89
20	1.7	51	2.65	241	2.05	98	1.95	82
21	1.7	51	2.35	160	2.0	89	2.0	89
22	1.7	51	2.25	137	2.05	98	2.0	89
23	1.7	51	2.3	148	2.05	98	1.9	74
24	1.7	51	2.3	148	2.0	89	2.05	98
25	1.7	51	2.3	148	2.05	98	.....	.....
26	1.7	51	2.35	160	2.1	106	.....	.....
27	1.6	43	2.35	160	2.1	106	.....	.....
28	1.6	43	2.35	160	2.05	98	.....	.....
29	1.65	47	2.35	160	2.05	98	.....	.....
30	1.7	51	2.25	137	2.0	89	.....	.....
31	.....	.....	2.25	137	.....	.....	.....	.....

Monthly discharge of Los Pinos River near Ignacio, Colo., for 1910.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September	51	36	43.4	0.096	0.11	2,560
October	440	43	117	.260	.30	7,200
November	126	89	106	.236	.26	6,300
December	98	74	90.3	.201	.18	4,300

ANIMAS RIVER AT DURANGO, COLO.

This station, which is located on the Rio Grande Southern Railroad bridge at Durango, Colo., was established August 22, 1910, by the State engineer of Colorado, by whom the records are furnished. From June 20, 1895, to December 31, 1905, a station was maintained by the United States Geological Survey at the wagon bridge 200 feet above the present site. The relation between the original and the present gages has not been determined. Lightner Creek enters the Animas between the two localities.

A standard chain gage is fastened to the bridge and a Bristol automatic gage was installed November 3, 1910, with datum the same as that of the chain gage. The automatic gage was removed November 27, 1910, because of some necessary construction work on the bridge and was replaced February 9, 1911.

The bed of the stream consists of sand, gravel, and bowlders, and shifts somewhat. Both banks are subject to overflow. The measuring section at the bridge is only fair.

Low-stage measurements are made by wading; high-stage measurements are made from the bridge.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Animas River at Durango, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 22	Ferguson and Christiansen	105	190	1.55	316
Sept. 19	E. O. Christiansen	100	188	1.50	315
Nov. 3	Christiansen and Hezmalhalch	100	180	1.55	312

Daily gage height, in feet, of Animas River at Durango, Colo., for 1910.

[Henry Schunk, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.55	.....	1.7	1.4	16	.....	1.5	2.05	1.45	1.4
2	.....	1.55	1.45	1.55	1.4	17	.....	1.5	2.3	1.45	1.4
3	.....	1.5	1.5	1.55	1.4	18	.....	1.5	2.2	1.45	1.4
4	.....	1.65	1.4	1.55	1.4	19	.....	1.5	1.9	1.45	1.4
5	.....	1.7	1.4	1.55	1.4	20	.....	1.5	1.9	1.4	1.3
6	.....	1.6	1.4	1.5	1.4	21	.....	1.6	1.9	1.35	1.3
7	.....	1.6	1.4	1.5	1.4	22	.....	1.7	1.9	1.4	1.3
8	.....	1.6	1.4	1.5	1.4	23	1.6	1.6	1.9	1.35	1.3
9	.....	1.5	1.4	1.45	1.4	24	1.6	1.6	1.9	1.25	1.3
10	.....	1.5	1.4	1.4	1.4	25	1.6	1.6	1.9	1.25	1.3
11	.....	1.5	1.4	1.5	1.4	26	1.6	1.6	1.8	1.25	1.3
12	.....	1.5	1.4	1.6	1.4	27	1.6	1.5	1.8	1.3	1.3
13	.....	1.5	1.4	1.6	1.4	28	1.6	1.5	1.8	1.4	1.3
14	.....	1.5	1.4	1.55	1.4	29	1.5	1.4	1.8	1.4	1.3
15	.....	1.5	1.4	1.5	1.4	30	1.5	1.4	1.8	1.4	1.2
						31	1.5	.....	1.75	.....	1.2

ANIMAS RIVER AT AZTEC, N. MEX.

This station, which is located about one-third mile west of Aztec, N. Mex., on the main wagon road to Farmington and La Plata, was originally established June 21, 1904, at the wooden truss highway bridge about three-eighths of a mile west of Aztec, was discontinued December 14, 1904, and reestablished at the same location June 8, 1907. On September 13, 1908, it was moved to a new suspension bridge about half a mile above the old bridge, which was torn down on completion of the new bridge. The station, although 20 miles above the mouth of the river, is below all important tributaries.

The drainage area comprises about 1,300 square miles.

Between Durango and Aztec many large ditches divert water for irrigation, and the discharge at the station does not represent the total run-off of the stream. Notwithstanding the numerous existing water rights, an ample supply of water is available for future development.

No change in the staff gage or gage datum was made during the maintenance of the station at the old site. Beginning September 13, 1908, an inclined staff gage was read, installed a few feet downstream from the suspension bridge at an arbitrary datum.

Ice forms to a considerable depth along the edges during the greater part of the winter, but the river seldom freezes across. Slush ice frequently occurs during the winter months.

Discharge measurements of Animas River at Aztec, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 9	W. B. Freeman	149	168	4.00	383
Mar. 27	G. J. Lyon	151	364	5.30	1,440
May 31	G. H. Russell	155	709	7.30	4,210
June 21	R. H. Bolster	151	436	5.24	1,360
Aug. 17	G. J. Lyon	135	130	3.95	291
23	V. L. Sullivan	135	161	3.90	349
Oct. 10	J. B. Stewart	60	61	3.71	193
Dec. 9	C. B. Digby	134	121	3.70	225

Daily gage height, in feet, of Animas River at Aztec, N. Mex., for 1910.

[H. S. Wattles, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.1	4.0	4.4	4.8	6.4	7.4	4.9	4.7	3.8	3.75	4.05	3.8
2	4.2	4.0	4.4	4.8	6.1	7.1	4.8	4.4	3.8	3.75	4.0	3.8
3	4.2	4.0	4.6	4.8	5.8	7.05	4.7	4.3	3.75	3.75	4.0	3.8
4	4.1	4.0	4.7	4.8	5.6	6.8	4.65	4.6	3.8	3.75	4.0	3.8
5	4.1	4.0	4.8	4.8	5.7	6.6	4.6	5.45	3.9	3.8	4.0	3.8
6	4.0	4.0	5.0	4.75	5.8	6.5	4.5	5.1	3.85	3.8	4.0	3.8
7	4.0	4.0	5.2	4.75	5.9	6.3	4.5	4.7	3.8	3.8	4.0	3.8
8	4.0	4.0	5.3	4.8	5.9	6.15	4.45	4.5	3.8	3.8	4.0	3.75
9	4.0	4.0	5.4	4.8	6.5	6.1	4.4	4.4	3.8	3.75	4.0	3.7
10	4.1	4.0	5.1	4.8	6.85	6.0	4.4	4.3	3.8	3.75	4.0	3.7
11	4.2	4.0	4.9	4.8	7.2	5.9	4.35	4.3	3.8	3.7	3.9	3.75
12	4.2	4.0	4.9	4.9	7.4	5.9	4.3	4.25	3.8	3.7	3.9	3.8
13	4.1	4.0	5.0	5.0	7.1	5.9	4.2	4.2	3.8	3.7	3.9	3.8
14	4.0	4.05	5.1	5.0	6.8	5.9	4.2	4.2	3.8	3.7	3.9	3.75
15	4.0	4.15	5.1	5.0	6.65	5.8	4.15	4.2	3.8	3.7	3.9	3.75
16	4.0	4.05	5.1	5.0	6.45	5.65	4.1	4.1	3.8	4.0	4.0	3.75
17	4.0	3.9	5.1	4.9	6.2	5.5	4.1	4.0	3.8	4.55	3.95	3.75
18	4.0	3.8	5.1	4.8	6.0	5.2	4.1	4.0	3.8	4.45	3.95	3.7
19	4.05	3.8	5.2	4.8	6.0	5.2	4.1	3.9	3.8	4.3	3.95	3.7
20	4.1	3.95	5.2	5.0	6.05	5.2	4.1	3.9	3.9	4.4	3.9	3.7
21	4.1	4.0	5.35	5.6	6.0	5.1	4.1	3.9	3.8	4.3	3.9	3.7
22	4.1	4.0	5.5	5.65	5.8	5.1	4.1	3.9	4.0	4.2	3.9	3.7
23	4.1	4.0	5.7	5.5	5.6	5.1	4.1	3.9	4.0	4.2	3.85	3.7
24	4.1	4.1	5.7	5.8	5.4	5.0	4.05	3.8	3.9	4.15	3.85	3.7
25	4.1	4.3	5.6	6.1	5.7	5.0	4.05	3.8	3.9	4.1	3.85	3.7
26	4.05	4.4	5.6	6.45	5.8	4.9	4.0	3.8	3.9	4.1	3.85	3.7
27	4.0	4.15	5.3	6.5	5.6	4.8	4.3	3.8	3.85	4.1	3.85	3.7
28	4.0	4.2	5.2	6.5	6.3	4.7	4.25	3.7	3.85	4.1	3.85	3.75
29	4.0	.....	5.1	6.85	6.9	5.2	4.2	3.7	3.8	4.1	3.85	3.9
30	4.0	.....	5.0	6.8	7.2	5.15	4.2	3.7	3.8	4.1	3.8	3.8
31	4.0	.....	4.9	.....	7.4	.....	4.4	3.8	.....	4.05	.....	3.7

Daily discharge, in second-feet, of Animas River at Aztec, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	420	360	620	945	2,860	4,670	1,040	860	260	240	390	260
2	480	360	620	945	2,420	4,090	945	620	260	240	360	260
3	480	360	775	945	2,020	4,000	860	545	240	240	360	260
4	420	360	860	945	1,770	3,530	818	775	260	240	360	260
5	420	360	945	945	1,890	3,180	775	1,590	310	260	360	260
6	360	360	1,130	902	2,020	3,020	695	1,230	285	260	360	260
7	360	360	1,330	902	2,140	2,720	695	860	260	260	360	260
8	360	360	1,430	945	2,140	2,490	658	695	260	260	360	240
9	360	360	1,540	945	3,020	2,420	620	620	260	240	360	220
10	420	360	1,230	945	3,620	2,280	620	545	260	240	360	220
11	480	360	1,040	945	4,280	2,140	582	545	260	220	310	240
12	480	360	1,040	1,040	4,670	2,140	545	512	260	220	310	260
13	420	360	1,130	1,130	4,090	2,140	480	480	260	220	310	260
14	360	390	1,230	1,130	3,530	2,140	480	480	260	220	310	240
15	360	450	1,230	1,130	3,260	2,020	450	480	260	220	310	240
16	360	390	1,230	1,130	2,940	1,830	420	420	260	360	360	240
17	360	310	1,230	1,040	2,560	1,650	420	360	260	735	335	240
18	360	260	1,230	945	2,280	1,330	420	360	260	658	335	220
19	390	260	1,330	945	2,280	1,330	420	310	260	545	335	220
20	420	335	1,330	1,130	2,350	1,330	420	310	310	620	310	220
21	420	360	1,480	1,770	2,280	1,230	420	310	260	545	310	220
22	420	360	1,650	1,830	2,020	1,230	420	310	360	480	310	230
23	420	360	1,890	1,650	1,770	1,230	420	310	360	480	285	220
24	420	420	1,890	2,020	1,540	1,130	390	260	310	450	285	220
25	420	545	1,770	2,420	1,890	1,130	390	260	310	420	285	220
26	390	620	1,770	2,940	2,020	1,040	360	260	310	420	285	220
27	360	450	1,430	3,020	1,770	945	545	260	285	420	285	220
28	360	480	1,330	3,020	2,720	860	512	220	285	420	285	240
29	360	.....	1,230	3,620	3,710	1,330	480	220	260	420	285	310
30	360	.....	1,130	3,530	4,280	1,280	480	220	260	420	260	260
31	360	.....	1,040	.....	4,670	.....	620	260	.....	390	.....	220

NOTE.—Daily discharge determined from a fairly well defined curve.

Monthly discharge of Animas River at Aztec, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	480	360	399	24,500	B.
February	620	260	381	21,200	B.
March	1,890	620	1,260	77,500	B.
April	3,620	902	1,520	90,400	B.
May	4,670	1,540	2,740	168,000	B.
June	4,670	860	2,060	123,000	B.
July	1,040	360	561	34,500	B.
August	1,590	220	500	30,700	B.
September	360	240	277	16,500	B.
October	735	220	367	22,600	B.
November	390	260	324	19,300	B.
December	310	220	240	14,800	B.
The year	4,670	220	888	643,000	

FLORIDA RIVER NEAR DURANGO, COLO.

This station, which is located at the wagon bridge at Cash ranch, about 7½ miles from Durango, was established September 18, 1910, by the State engineer of Colorado, by whom the records are furnished. From May 19 to July 31, 1899, and from April 1, 1901, to October 31, 1903, the United States Geological Survey maintained a station

on the Florida near Durango. The present station is believed to be at the original site, but the relation between the gages has not been determined.

A vertical staff gage is bolted to the abutment of the bridge.

The bed of the stream is composed of large and small bowlders, sand, and mud and probably shifts but slightly. The measuring section at the bridge is only fair.

Discharge measurements are made from the bridge at high water.

The relation between gage height and discharge is affected by ice during the winter months.

Discharge measurements of Florida River near Durango, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 18	E. O. Christiansen	26	20	1.45	25
Oct. 25	Christiansen and Hezmalhalch	28	27	1.70	49

Daily gage height, in feet, and discharge, in second-feet, of Florida River near Durango, Colo., for 1910.

[Thomas Cash, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			1.35	19	1.6	38	1.5	29
2			1.4	22	1.6	38	1.5	29
3			1.4	22	1.6	38	1.4	22
4			1.4	22	1.6	38	1.4	22
5			1.4	22	1.6	38	1.45	25
6			1.4	22	1.55	34	1.7	49
7			1.35	19	1.55	34	1.5	29
8			1.35	19	1.55	34	1.55	34
9			1.3	16	1.55	34	1.5	29
10			1.3	16	1.55	34	1.5	29
11			1.3	16	1.5	29	1.35	19
12			1.3	16	1.5	29	1.4	22
13			1.35	19	1.5	29	1.4	22
14			1.4	22	1.5	29	1.4	22
15			1.4	22	1.45	25	1.4	22
16			1.7	49	1.5	29	1.7	49
17			1.75	55	1.5	29	1.55	34
18	1.4	22	1.7	49	1.6	38	1.35	19
19	1.45	25	1.65	44	1.55	34	1.4	22
20	1.5	29	1.6	38	1.5	29	1.35	19
21	1.5	29	1.65	44	1.55	34	1.4	22
22	1.6	38	1.7	49	1.6	38	1.4	22
23	1.55	34	1.65	44	1.5	29	1.35	19
24	1.5	29	1.65	44	1.5	29	1.4	22
25	1.5	29	1.7	49	1.4	22	1.4	22
26	1.4	22	1.7	49	1.4	22	1.4	22
27	1.4	22	1.75	55	1.5	29	1.4	22
28	1.4	22	1.65	44	1.5	29	1.3	16
29	1.4	22	1.65	44	1.5	29	1.3	16
30	1.35	19	1.65	44	1.5	29	1.35	19
31			1.65	44			1.4	22

Monthly discharge of Florida River near Durango, Colo., for 1910.

[Drainage area, 136 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 18-30	38	19	26.3	0.193	0.09	678
October	55	16	33.5	.246	.28	2,060
November	38	22	31.7	.233	.26	1,890
December	49	16	24.9	.183	.21	1,530

LA PLATA RIVER AT HESPERUS, COLO.

This station, which is located at the Rio Grande Southern Railroad trestle at Hesperus, Colo., was established August 24, 1910, by the State engineer of Colorado, by whom the records are furnished. From June 14, 1904, to August 18, 1906, the United States Geological Survey maintained a station about 100 feet above the present site. No water is diverted and no tributaries enter between the two localities. The relation between the gages used has not been determined.

A vertical staff gage is bolted to one of the trestle bents.

The bed of the stream is composed of gravel and bowlders, and shifts. Both banks are subject to overflow. The measuring section is fair.

Measurements are made by wading.

The relation between gage and discharge is somewhat affected by ice during the winter months.

Discharge measurements of La Plata River at Hesperus, Colo., 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 24	Christiansen and Ferguson	9	6.5	0.80	3
Sept. 19	E. O. Christiansen	9.5	4.3	.82	3.6
Oct. 26	Christiansen and Heznalhalch	12	5.6	1.05	8.0

Daily gage height, in feet, and discharge, in second-feet, of La Plata River at Hesperus, Colo., for 1910.

[J. C. Reed, observer.]

Day.	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.9	4.8	0.8	3.2	1.05	8.1	1.5	
2			.8	3.2	.9	4.8	1.0	6.9	1.5	
3			.85	4.0	.85	4.0	1.0	6.9	1.5	
4			.9	4.8	.8	3.2	1.1	9.4	1.5	
5			.85	4.0	.8	3.2	1.2	13	1.65	
6			.9	4.8	.85	4.0	1.1	9.4	1.45	
7			.8	3.2	.85	4.0	1.1	9.4	1.5	
8			.8	3.2	.8	3.2	1.4	20	1.5	
9			.85	4.0	.85	4.0	1.4	20	1.5	
10			.85	4.0	.8	3.2	1.4	20	1.5	
11			.9	4.8	.9	4.8	1.65		1.5	
12			.85	4.0	.85	4.0	1.6		1.5	
13			.8	3.2	.85	4.0	1.6		1.65	
14			.8	3.2	1.0	6.9	1.6		1.7	
15			.85	4.0	1.0	6.9	1.6		1.65	
16			.85	4.0	.95	5.8	1.75		1.7	
17			.8	3.2	1.0	6.9	1.8		1.6	
18			.85	4.0	1.0	6.9	1.7		1.55	
19			.85	4.0	.9	4.8	1.65		1.55	
20			.9	4.8	.9	4.8	1.6		1.5	
21			.8	3.2	.95	5.8	1.55		1.6	
22			.8	3.2	.95	5.8	1.5		1.75	
23			.8	3.2	1.1	9.4	1.65		1.60	
24	0.8	3.2	.8	3.2	1.05	8.1	1.7		1.6	
25	.8	3.2	.8	3.2	1.0	6.9	1.55		1.5	
26	.8	3.2	.8	3.2	.95	5.8	1.5		1.5	
27	.85	4.0	.85	4.0	1.1	9.4	1.4		1.55	
28	.85	4.0	.85	4.0	1.0	6.9	1.7		1.7	
29	.8	3.2	.8	3.2	1.05	8.1	1.6		1.5	
30	.9	4.8	.8	3.2	1.0	6.9	1.7		1.5	
31	.8	3.2			1.1	9.4			1.5	

Monthly discharge of La Plata River at Hesperus, Colo., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
August 24–31	4.8	3.2	3.60	57
September	4.8	3.2	3.76	224
October	9.4	3.2	5.65	347
November 1–10	20	6.9	12.3	244

LA PLATA RIVER AT LA PLATA, N. MEX.

This station, which is located at a wooden single-span highway bridge, about 16 miles northwest of Aztec, N. Mex., and 1 mile south of La Plata post office, in sec. 3, T. 31 N., R. 13 W., New Mexico principal meridian, was established May 25, 1905. This station is below all tributaries and is about 15 miles above the mouth of the river. The drainage area is about 340 square miles.

Nearly all the normal flow of this stream is diverted for irrigation above the station, and there are a few small diversions below.

On December 9, 1908, a chain gage was installed on the bridge and is read in place of the rod gage, as the latter does not record low stages. The datum remained unchanged.

Thin ice frequently forms across the stream during the winter period, thick ice forms along the edges, and slush ice at times interferes with winter measurements.

Because of shifting conditions of channel and the uncertainty of some of the gage heights, the results obtained at this station are not good.

Discharge measurements of La Plata River at La Plata, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	W. B. Freeman	26	138	2.05	9.4
Mar. 25	G. J. Lyon	34	48	3.25	232
May 29	G. H. Russell	2.5	.9	1.85	.9
June 21	R. H. Bolster			1.8	*a* 1.5
Aug. 18	G. J. Lyon	1.7	.2	3.36	.1
Oct. 10	J. B. Stewart			3.42	*a* .5
Dec. 9	C. B. Digby			3.55	*a* .5

a Estimated.

Daily gage height, in feet, of La Plata River at La Plata, N. Mex., for 1910.

[Frank Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.0	2.15	3.7	2.95	2.9	1.9	1.8	1.75	3.4	3.4	3.6	3.6
2	1.95	2.15	2.9	2.9	2.8	1.9	1.8	1.75	3.4	3.4	3.6	3.6
3	1.95	2.15	2.6	2.85	2.7	1.8	1.8	1.75	5.8	3.4	3.6	3.6
4	1.95	2.15	3.9	2.8	2.6	1.7	1.8	3.0	3.8	3.4	3.7	3.6
5	1.95	2.15	3.5	2.8	2.5	1.8	1.8	2.1	3.4	3.4	.....	3.6
6	1.95	2.15	3.2	2.8	2.5	1.8	1.75	2.9	3.4	3.4	.....	3.6
7	1.95	2.05	3.3	2.8	2.45	1.8	1.75	2.6	3.4	3.4	.....	3.6
8	1.95	2.15	3.2	2.75	2.5	1.8	1.75	3.0	3.4	3.4	.....	3.4
9	1.95	2.15	3.1	2.75	2.55	1.8	1.75	2.1	3.4	3.4	.....	3.4
10	1.95	2.15	3.0	2.75	2.6	1.8	1.75	2.9	3.4	3.4	.....	3.4
11	2.1	2.15	3.0	2.7	2.5	1.8	1.75	2.6	3.4	3.4	.....	3.4
12	2.1	2.15	3.0	2.7	2.55	1.8	1.75	7.6	3.4	3.4	3.6	3.4
13	2.1	2.15	3.0	2.65	2.6	1.8	1.75	4.6	3.4	3.4	3.6	3.4
14	2.1	2.15	3.1	2.75	2.55	1.8	1.75	3.9	3.4	3.4	3.6	3.4
15	2.1	2.3	3.1	2.75	2.5	1.8	1.75	3.7	3.4	3.4	3.6	3.4
16	2.1	2.4	3.0	2.7	2.4	.....	1.75	3.6	3.4	5.6	3.6	3.4
17	2.1	2.2	3.1	2.6	2.3	.....	1.75	3.6	3.4	4.0	3.6	3.4
18	2.1	2.2	3.2	2.55	2.1	.....	1.75	3.6	3.4	3.95	3.6	3.4
19	2.1	2.1	3.2	2.7	1.9	.....	1.75	3.6	3.4	4.1	3.6	3.4
20	2.1	2.1	3.2	2.75	1.85	.....	1.75	3.5	3.4	3.9	3.6	3.4
21	2.1	2.1	3.3	2.9	1.95	.....	1.75	3.4	3.5	3.9	3.6	3.4
22	2.1	2.1	3.2	2.9	1.9	.....	1.75	3.4	3.4	3.8	3.6	3.4
23	2.1	2.7	3.2	2.95	1.9	.....	1.75	3.4	3.4	3.7	3.6	3.4
24	2.1	2.6	.....	3.0	1.85	.....	1.75	3.4	3.4	3.7	3.6	3.4
25	2.1	2.8	.....	3.3	1.9	.....	1.75	3.4	3.4	3.7	3.6	3.4
26	2.1	2.9	.....	3.5	1.85	.....	1.75	3.4	3.4	3.6	3.6	3.6
27	2.1	3.0	2.8	3.3	1.8	.....	1.75	3.4	3.4	3.6	3.6	3.6
28	2.1	3.5	2.9	3.2	1.8	2.5	1.75	3.4	3.4	3.6	3.6	3.6
29	2.15	.....	2.7	3.2	1.75	2.0	1.75	3.4	3.4	3.6	3.6	3.6
30	2.15	.....	2.9	3.05	1.75	1.9	1.75	3.4	3.4	3.6	3.6	3.6
31	2.15	.....	3.05	.....	1.8	.....	1.75	3.4	.....	3.6	.....	3.6

Daily discharge, in second-feet, of La Plata River at La Plata, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.5	18	409	150	138	2.5	1.5	1.0	0.1	0.5	1.0	1.0
2	4.5	18	138	138	114	2.5	1.5	1.0	.1	.5	1.0	1.0
3	4.5	18	73	126	91	1.0	1.5	1.0	670	.5	1.0	1.0
4	4.5	18	495	114	73	.3	1.5	163	21	.5	3.0	1.0
5	4.5	18	331	114	58	1.0	1.5	14	.5	.5	3.0	1.0
6	4.5	18	224	114	58	1.1	1.0	138	.5	.5	2.0	1.0
7	4.5	10	258	114	51	1.1	1.0	73	.5	.5	2.0	1.0
8	4.5	18	224	102	58	1.1	1.0	163	.5	.5	2.0	.5
9	4.5	18	193	102	66	1.2	1.0	14	.5	.5	2.0	.5
10	4.5	18	163	102	73	1.2	1.0	138	.5	.5	1.0	.5
11	14	18	163	91	58	1.2	1.0	73	.5	.5	1.0	.5
12	14	18	163	91	66	1.2	1.0	7,000	.5	.5	1.0	.5
13	14	18	163	82	73	1.3	1.0	160	.5	.5	1.0	.5
14	14	18	193	102	66	1.3	1.0	31	.5	.5	1.0	.5
15	14	32	193	102	58	1.3	1.0	10	.5	.5	1.0	.5
16	14	44	163	91	44	1.3	1.0	3.0	.5	570	1.0	.5
17	14	22	193	73	32	1.4	1.0	1.0	.5	30	1.0	.5
18	14	22	224	66	14	1.4	1.0	.1	.5	25	1.0	.5
19	14	14	224	91	2.5	1.4	1.0	.1	.5	42	1.0	.5
20	14	14	224	102	1.0	1.5	1.0	.1	.5	20	1.0	.5
21	14	14	258	138	4.5	1.5	1.0	.1	2.5	20	1.0	.5
22	14	14	224	138	2.5	1.5	1.0	.1	.5	10	1.0	.5
23	14	91	224	150	2.5	1.5	1.0	.1	.5	3.0	1.0	.5
24	14	73	193	163	1.0	1.5	1.0	.1	.5	2.0	1.0	.5
25	14	114	163	258	2.5	1.5	1.0	.1	.5	2.0	1.0	.5
26	14	138	138	331	1.0	1.5	1.0	.1	.5	1.0	1.0	2.0
27	14	163	114	258	.8	1.5	1.0	.1	.5	1.0	1.0	2.0
28	14	331	138	224	.8	58	1.0	.1	.5	1.0	1.0	2.0
29	18	.....	91	224	.5	6.5	1.0	.1	.5	1.0	1.0	2.0
30	18	.....	138	178	.5	2.5	1.0	.1	.5	1.0	1.0	2.0
31	18	.....	178	.....	.8	.....	1.0	.1	.....	1.0	.....	2.0

NOTE.—Daily discharge Jan. 1 to May 20 and Aug. 4 to 11 determined from a fairly well defined discharge rating curve. Daily discharge for remaining periods obtained by use of indirect method for shifting channels.

Monthly discharge of La Plata River at La Plata, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	18	4.5	11.4	701	C.
February	331	10.2	47.5	2,640	B.
March	495	73	202	12,400	B.
April	331	66	138	8,210	C.
May	138	.5	39.1	2,400	C.
June	58	.3	3.46	206	C.
July	1.5	1.0	1.08	66	C.
August	7,000	.1	258	15,900	D.
September	670	.1	23.5	1,400	D.
October	570	.5	23.8	1,460	D.
November	3	1.0	1.27	76	D.
December	2	.5	.90	55	D
The period	7,000	.1	62.8	45,500	

WEST MANCOS RIVER NEAR MANCOS, COLO.

This station, which is located at Crane's ranch, about 4 miles above the town of Mancos, Colo., was established September 16, 1910, by the State engineer of Colorado, by whom the records are furnished.

A vertical staff gage is attached to a tree on right bank.

The bed of the stream is composed of gravel and small bowlders. The section is fair.

All measurements are made by wading.

The relation between gage height and discharge is somewhat affected by ice during the winter.

Discharge measurements of West Mancos River near Mancos, Colo., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 16	E. O. Christiansen	18	9.2	0.62	9.3
Oct. 28	Christiansen and Hezmalhalch	21	12	.72	12.1

Daily gage height, in feet, and discharge, in second-feet, of West Mancos River near Mancos, Colo., for 1910.

[W. H. Crane, observer.]

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.6	8.7	0.7	11.6	0.65	10.2
2			.6	8.7	.7	11.6	.65	10.2
3			.7	11.6	.7	11.6	.65	10.2
4			.7	11.6	.8	14.7	.65	10.2
5			.65	10.2	.8	14.7	.65	10.2
6			.6	8.7	.8	14.7	.65	10.2
7			.6	8.7	.75	13.2	.6	8.7
8			.6	8.7	.7	11.6	.6	8.7
9			.6	8.7	.7	11.6	.6	8.7
10			.6	8.7	.7	11.6	.6	8.7
11			.6	8.7	.7	11.6	.6	8.7
12			.6	8.7	.7	11.6	.6	8.7
13			.6	8.7	.7	11.6	.6	8.7
14			.6	8.7	.7	11.6	.6	8.7
15			.7	11.6	.65	10.2	.6	8.7
16			1.15	27.4	.65	10.2	.6	8.7
17			1.1	25.4	.65	10.2	.6	8.7
18	0.6	8.7	.9	18.0	.65	10.2	.6	8.7
19	.6	8.7	.9	18.0	.65	10.2	.6	8.7
20	.6	8.7	.8	14.7	.65	10.2	.6	8.7
21	.6	8.7	.8	14.7	.65	10.2	.6	8.7
22	.6	8.7	.75	13.2	.65	10.2	.6	8.7
23	.6	8.7	.75	13.2	.65	10.2	.6	8.7
24	.6	8.7	.75	13.2	.65	10.2		
25	.6	8.7	.75	13.2	.65	10.2		
26	.6	8.7	.75	13.2	.65	10.2		
27	.6	8.7	.75	13.2	.65	10.2		
28	.6	8.7	.7	11.6	.65	10.2		
29	.6	8.7	.7	11.6	.65	10.2		
30	.6	8.7	.7	11.6	.65	10.2		
31			.7	11.6				

Monthly discharge of West Mancos River near Mancos, Colo., for 1910.

[Drainage area, 46 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
September 18–30	8.7	8.7	8.7	0.189	0.092	224
October	27.4	8.7	12.4	.270	.311	762
November	14.7	10.2	11.2	.243	.271	666
December 1–23	10.2	8.7	9.08	.197	.17	414

VIRGIN RIVER BASIN.

GENERAL FEATURES.[1]

Virgin River rises in the Colob Plateau, in the southwestern part of Utah, at an altitude ranging from 8,000 to 10,000 feet above sea level, flows in a general southerly course across the southwestern corner of Arizona into Nevada, where it turns and flows southward to its junction with the Colorado at Rioville, just above Boulder Canyon. The smaller creeks that drain the eastern portion of the plateau unite after descending to an altitude of 5,500 feet above the sea and form what is called Parunuweap Fork of the Virgin. At and below the junction of these creeks the canyon valley in which they flow widens into what is known as Long Valley. Below Long Valley the East Fork enters Parunuweap Canyon and is simply a series of cascades for 15 miles, descending in this distance from 5,000 to 3,500 feet above sea level. Emerging from this canyon it enters the valley of the Virgin. This valley is 44 miles long. Its upper portion is only an enlargement of the canyon; its lower portion is a broader valley, much broken by low basalt-covered mesas and sharp ridges of tilted sedimentary rocks. In the upper part of the valley the river receives several tributaries, the principal ones being Little Zion, North Fork, La Verkin, and Ashe creeks. Midway of the valley two streams enter from the Pine Valley Mountains, and near the foot Santa Clara River joins the Virgin, the united streams leaving the valley by a deep canyon cut through the Beaver Dam Mountains. The valley of the Virgin is at a lower altitude and has a warmer climate than any other portion of Utah. The soil of the irrigable lands is usually good, and wherever irrigation can be practiced it produces abundant crops.

VIRGIN RIVER AT VIRGIN, UTAH.

This station, which is located about half a mile east of and above the town of Virgin, Utah, about 1,000 feet below the mouth of North Creek and about 8 miles above Ashe and La Verkin creeks, was established April 18, 1909.

There are no diversions of any importance above the station.

The first gage was used until August 7, when the section was changed by a flood which caused the water to leave the gage. On August 31 the gage, cable, and bench marks were washed out and the section materially altered. On October 13 a new gage was installed at a different datum. Owing to the marked change in the channel, there can be no determined relation between the old and new gages.

[1] Abstracted from report on the lands of the arid region of the United States, with a more detailed account of the lands of Utah, by J. W. Powell, 1878: Chapter 9, Irrigable lands of that portion of Utah drained by the Colorado River and its tributaries, by A. H. Thompson, pp. 151–153.

The accuracy of the records is unaffected by ice or by artificial control above or below the station.

Discharge measurements of Virgin River at Virgin, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 26	E. A. Porter	127	67	2.85	204
Apr. 15	Leonard Tanner	118	113	3.58	505
May 6	.....do	114	104	3.42	397
June 28	.....do	115	59	2.25	130
Aug. 17	.....do	110	40	2.10	81
Sept. 23	.....do	61	44	2.75	134
Nov. 9	.....do	64	42	3.00	133
Dec. 19	G. C. Baldwin	72	45	3.03	119

Daily gage height, in feet, of Virgin River at Virgin, Utah, for 1910.

[Niles Earl, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.8	2.9	3.45	.....	3.95	2.55	2.15	.....	2.25	.....	.....	2.95
2	3.6	2.9	3.55	.....	3.9	2.5	2.2	.....	2.3	.....	2.9	2.95
3	2.9	3.0	3.6	.....	3.8	2.45	2.25	.....	4.2	.....	2.85	.....
4	2.8	3.05	3.75	.....	3.5	2.4	2.2	2.2	2.4	2.75	2.9	2.95
5	2.9	3.0	3.75	.....	3.4	2.35	2.2	2.8	2.5	.....	2.85	2.9
6	2.8	2.9	3.8	.....	3.35	2.3	2.2	3.5	2.3	2.6	.....	.....
7	2.75	2.8	3.75	.....	3.45	2.3	2.2	.....	2.35	.....	2.9	2.95
8	2.9	2.85	3.6	.....	3.4	2.3	2.15	.....	2.35	2.5	2.95	2.9
9	2.8	2.7	3.8	.....	3.3	2.3	2.1	.....	2.3	2.55	2.95	2.95
10	2.75	2.9	3.8	.....	3.2	2.25	2.15	2.5	2.4	.....	.....	.....
11	2.85	3.0	3.85	.....	3.3	2.3	2.15	2.4	2.3	3.1	2.95	3.0
12	2.9	3.0	3.8	.....	3.1	2.3	2.1	2.4	2.4	.....	2.95	3.0
13	2.9	3.0	3.85	.....	3.3	2.25	2.15	2.2	2.35	2.65	3.0	2.95
14	2.9	3.05	3.9	.....	3.1	2.25	2.1	2.25	4.35	3.2	3.5	2.95
15	2.95	3.0	4.0	.....	3.05	2.3	2.1	2.25	3.6	4.7	3.2	.....
16	2.95	2.95	4.05	.....	3.1	2.3	2.15	2.2	2.65	3.65	.....	.....
17	2.8	2.9	4.3	.....	3.15	2.3	2.25	.....	4.6	.....	2.8	3.0
18	2.9	2.85	4.4	.....	2.95	2.25	2.2	2.3	.....	3.25	2.75	3.0
19	2.85	2.9	4.6	.....	2.9	2.25	2.2	2.2	2.9	.....	.....	3.0
20	2.9	2.95	4.65	.....	2.95	2.3	2.15	2.3	2.85	2.9	2.85	2.95
21	2.85	3.0	4.45	.....	3.0	2.3	2.15	.....	.....	.....	2.85	3.0
22	2.75	3.0	5.5	.....	2.85	2.25	2.2	.....	2.75	2.75	.....	2.95
23	2.7	3.05	4.5	.....	2.8	2.15	2.1	.....	2.75	2.7	.....	.....
24	2.9	3.0	4.3	.....	2.75	2.25	2.15	3.7	.....	.....	2.9	.....
25	2.9	2.95	4.1	.....	2.7	2.15	2.15	2.25	.....	2.85	2.9	3.5
26	2.85	3.0	.....	.....	2.7	2.2	2.1	2.25	2.75	2.9	3.0	3.0
27	2.8	3.05	.....	.....	2.65	2.1	.....	2.2	2.75	2.85	2.9	.....
28	2.9	3.15	.....	.....	2.6	2.25	.....	2.2	2.75	2.9	2.9	3.5
29	2.9	.....	.....	.....	2.6	2.25	.....	2.2	.....	2.9	2.85	.....
30	2.9	.....	.....	.....	2.65	2.2	.....	2.15	2.75	2.9	2.95	3.5
31	2.9	.....	.....	.....	2.6	.....	.....	2.15	.....	2.9	.....	.....

NOTE.—The gage heights are rather uncertain Jan. 1 to May 15, when a new observer was secured, and they are so evidently in error Mar. 26 to Apr. 30 that they are not published. The observer's reading checks with hydrographer's on Jan. 26, but on Apr. 15 differs by 1 foot. Probably little error will be introduced by using the observer's gage heights prior to Mar. 26 and during period May 1 to 14.

Daily discharge, in second-feet, of Virgin River at Virgin, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,770	205	445	.....	755	155	98	103	127	138	100	111
2	530	205	501	.....	720	140	112	106	142	138	100	111
3	205	240	530	.....	650	130	127	109	1,350	138	90	111
4	173	259	620	.....	472	120	112	112	174	138	100	111
5	205	240	620	.....	418	110	112	335	210	119	90	100
6	173	205	650	.....	393	100	112	730	142	100	95	106
7	158	173	620	.....	450	100	112	600	158	90	100	111
8	205	189	530	.....	425	100	98	470	158	80	111	100
9	173	144	650	.....	380	100	84	340	142	90	111	111
10	158	205	650	.....	330	90	98	210	174	171	111	115
11	189	240	685	.....	390	105	98	174	142	252	111	122
12	205	240	650	.....	300	105	84	174	174	182	111	122
13	205	240	685	.....	395	100	98	112	158	112	122	111
14	205	259	720	.....	305	100	84	127	1,510	292	274	111
15	222	240	790	.....	285	110	84	127	800	1,020	174	111
16	222	222	830	.....	315	110	98	112	270	338	127	122
17	173	205	1,050	.....	340	110	127	127	1,230	264	80	122
18	205	189	1,140	.....	260	100	112	142	706	189	70	122
19	189	205	1,340	.....	245	100	112	112	182	144	80	122
20	205	222	1,400	.....	270	120	98	142	167	100	90	111
21	189	240	1,190	.....	300	120	98	325	152	85	90	122
22	158	240	2,410	.....	240	100	112	508	138	70	90	111
23	144	259	1,240	.....	220	80	84	691	138	60	100	165
24	205	240	1,050	.....	210	105	98	875	138	75	100	220
25	205	222	870	.....	190	85	98	127	138	90	100	274
26	189	240	650	.....	190	105	84	127	133	100	122	122
27	173	259	590	.....	180	85	88	112	138	90	100	198
28	205	300	720	.....	160	127	91	112	138	100	100	274
29	205	.....	472	.....	160	127	94	112	138	100	90	274
30	205	.....	650	.....	180	112	97	98	138	100	111	274
31	205	.....	530	.....	165	.....	100	98	.....	100	.....	274

NOTE.—Daily discharge determined as follows: Jan. 1–Mar. 25 and May 1–6, from a curve fairly well defined below 800 second-feet; Mar. 26–31, estimated from corrected gage heights; Apr. 1–30, no daily discharges published; May 7–June 27, the indirect method for shifting channels used; June 28–Sept. 16, from a curve which is fairly well defined below 200 second-feet; Sept. 17–Dec. 31, from a curve that is poorly defined. Discharge interpolated for days of missing gage height except for periods mentioned.

Monthly discharge of Virgin River at Virgin, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	2,770	144	286	17,600	C.
February	300	144	226	12,600	C.
March	2,410	445	822	50,500	C.
April	.....	.....	a620	36,900	D.
May	755	160	332	20,400	C.
June	155	80	108	6,430	C.
July	127	84	100	6,150	B.
August	875	98	247	15,200	B.
September	1,510	127	317	18,900	C.
October	1,020	60	163	10,000	C.
Novemb r	274	70	108	6,430	C.
December	274	100	147	9,040	C.
The year	2,770	60	290	210,000	

a Estimated.

SANTA CLARA RIVER NEAR CENTRAL, UTAH.

This station, which is located about 1½ miles southeast of Central, Utah, the nearest post office, and about 6 miles west from the settlement of Pine Valley, Utah, about one-fourth mile from R. H. Hunt's ranch house, in a small valley known as Eightmile Flat, was established April 21, 1909. The records show the total amount of water available for storage in the Pine Valley reservoir site, a few miles above the station.

The station is below all important tributaries except Mountain Meadows Creek, which enters about 10 miles below. A small canal, whose maximum capacity is about 3.5 second-feet, takes out water a short distance above the station.

The gage was destroyed by a flood on January 1, 1910. On January 20, 1910, a new gage was established at the same location but with its datum 0.45 foot higher.

The bed of the stream is somewhat shifting, but fairly accurate results have been obtained.

Discharge measurements are made from the gaging bridge.

The relation between gage height and discharge is not affected by ice.

Discharge measurements of Santa Clara River near Central, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage. height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	E. A. Porter	27	25	3.43	37
29	....do	27	26	3.35	28
Apr. 27	Leonard Tanner	29	52	3.90	116
June 17	....do	21	15	3.35	22
Aug. 4	....do	20	13	3.25	12
Sept. 16	....do	22	15	3.30	18
Oct. 11	....do	22	12	3.20	9.0
Nov. 18	....do	21	13	3.25	12
Dec. 22	G. C. Baldwin	21	12	3.22	9.5

Daily gage height, in feet, of Santa Clara River near Central, Utah, for 1910.

[R. H. Hunt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.5	3.35	3.35	3.55	3.85	3.45	3.3	3.25	3.2	3.2	3.2	3.2
2		3.35	3.4	3.6	3.8	3.4	3.3	3.25	3.2	3.2	3.2	3.2
3			3.5	3.6	3.75	3.4	3.3	3.25	3.3	3.2	3.2	3.2
4			3.6	3.5	3.7	3.35	3.3	3.25	3.25	3.2	3.2	3.2
5			3.7	3.5	3.7	3.35	3.25	3.25	3.25	3.2	3.2	3.2
6			3.7	3.55	3.7	3.35	3.25	3.2	3.25	3.2	3.2	3.2
7			3.7	3.55	3.7	3.4	3.2	3.2	3.25	3.2	3.2	3.2
8			3.7	3.55	3.7	3.4	3.2	3.2	3.2	3.2	3.2	3.2
9		3.3	3.6	3.55	3.7	3.4	3.2	3.2	3.2	3.2	3.2	3.2
10		3.3	3.6	3.6	3.75	3.35	3.2	3.3	3.2	3.2	3.2	3.2
11		3.35	3.6	3.7	3.75	3.35	3.2	3.4	3.2	3.2	3.2	3.2
12		3.4	3.6	3.8	3.75	3.35	3.2	3.3	3.2	3.2	3.2	3.2
13		3.5	3.55	3.8	3.8	3.3	3.2	3.3	3.25	3.2	3.25	3.2
14		3.5	3.55	3.7	3.8	3.3	3.2	3.3	3.25	3.2	3.3	3.2
15		3.35	3.55	3.7	3.8	3.3	3.2	3.3	3.25	3.3	3.3	3.2
16		3.3	3.55	3.7	3.8	3.3	3.2	3.3	3.3	3.3	3.3	3.2
17		3.35	3.6	3.75	3.8	3.35	3.25	3.25	3.3	3.25	3.25	3.2
18		3.35	3.65	3.75	3.75	3.35	3.2	3.25	3.25	3.25	3.25	3.2
19		3.35	3.65	3.75	3.7	3.35	3.2	3.25	3.7	3.25	3.25	3.2
20		3.35	3.8	3.75	3.6	3.3	3.2	3.25	3.25	3.25	3.2	3.2
21	3.4	3.35	3.85	3.75	3.6	3.3	3.2	3.25	3.25	3.2	3.2	3.2
22	3.4	3.35	3.9	3.8	3.55	3.25	3.3	3.3	3.2	3.2	3.2	3.2
23	3.35	3.35	3.8	3.8	3.55	3.25	3.25	3.3	3.2	3.2	3.2	3.2
24	3.35	3.4	3.6	3.8	3.5	3.3	3.25	3.25	3.2	3.2	3.2	3.2
25		3.35	3.6	3.8	3.5	3.3	3.4	3.25	3.2	3.2	3.2	3.2
26		3.35	3.6	3.8	3.5	3.3	3.3	3.25	3.2	3.2	3.25	3.2
27		3.35	3.55	3.9	3.5	3.3	3.3	3.25	3.2	3.2	3.25	3.2
28		3.35	3.55	3.9	3.5	3.3	3.3	3.2	3.2	3.2	3.25	3.2
29			3.5	4.0	3.5	3.3	3.25	3.2	3.2	3.2	3.2	3.2
30			3.5	3.95	3.45	3.3	3.25	3.2	3.2	3.2	3.2	3.2
31	3.35		3.5		3.45		3.25	3.2		3.2		3.2

NOTE.—New gage installed Jan. 20, about 1 mile above old site and at a different datum. Ice not reported.

Daily discharge, in second-feet, of Santa Clara River near Central, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	25	25	55	107	40	18	14	9	9	9	9
2	.....	25	32	63	98	32	18	14	9	9	9	9
3	.....	24	47	63	89	32	18	14	18	9	9	9
4	.....	23	63	47	80	25	18	14	14	9	9	9
5	.....	22	80	47	80	25	14	14	14	9	9	9
6	.....	21	80	55	80	25	14	9	14	9	9	9
7	.....	20	80	55	80	32	9	9	14	9	9	9
8	.....	19	80	55	80	32	9	9	9	9	9	9
9	.....	18	63	55	80	32	9	9	9	9	9	9
10	.....	18	63	63	89	25	9	18	9	9	9	9
11	.....	25	63	80	89	25	9	32	9	9	9	9
12	.....	32	63	98	89	25	9	18	9	9	9	9
13	.....	47	55	98	98	18	9	18	14	9	14	9
14	.....	47	55	80	98	18	9	18	14	9	18	9
15	.....	25	55	80	98	18	9	18	14	18	18	9
16	.....	18	55	80	98	18	9	18	18	18	18	9
17	.....	25	63	89	98	25	14	14	18	14	14	9
18	.....	25	72	89	89	25	9	14	14	14	14	9
19	.....	25	72	89	80	25	9	14	80	14	14	9
20	.....	25	98	89	63	18	9	14	14	14	9	9
21	32	25	107	89	63	18	9	14	14	9	9	9
22	32	25	116	98	55	14	18	18	9	9	9	9
23	25	25	98	98	55	14	14	18	9	9	9	9
24	25	32	63	98	47	18	14	14	9	9	9	9
25	25	25	63	98	47	18	32	14	9	9	9	9
26	25	25	63	98	47	18	18	14	9	9	14	9
27	25	25	55	116	47	18	18	14	9	9	14	9
28	25	25	55	116	47	18	18	9	9	9	14	9
29	25	.....	47	135	47	18	14	9	9	9	9	9
30	25	.....	47	126	40	18	14	9	9	9	9	9
31	25	.....	47	.....	40	.....	14	9	.....	9	.....	9

NOTE.—Daily discharge determined from a discharge rating curve fairly well defined throughout. Discharge interpolated Jan. 25 to 30 and Feb. 3 to 8.

Monthly discharge of Santa Clara River near Central, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 21–31	32	25	26.3	574	B.
February	47	18	25.6	1,420	B.
March	116	25	65.3	4,020	A.
April	135	47	83.4	4,960	A.
May	107	40	74.1	4,560	A.
June	40	14	22.9	1,360	B.
July	32	9	13.4	824	B.
August	32	9	14.3	879	B.
September	80	9	13.9	827	A.
October	18	9	10.2	627	A.
November	18	9	11.1	660	B.
December	9	9	9.0	553	B.
The period	.....	.....	.....	21,300	

SANTA CLARA RIVER NEAR ST. GEORGE, UTAH.

This station, which is located about 3 miles southwest of St. George, Utah, and about 3 miles above the mouth of the river, was originally established April 16, 1909.

The station is below all tributaries and diversions except two canals which head near the mouth of the river.

The original gage which was located about 1 mile below the present location was destroyed by flood about January 1, 1910. The present

gage, which was set January 21, 1910, is located on the right bank below the cable from which discharge measurements are made.

The relation between gage height and discharge is not affected by ice, but the bed of the stream shifts to a considerable extent. A fair record of run-off has, however, been obtained.

Discharge measurements of Santa Clara River near St. George, Utah, in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge at regular section.	Discharge at a point below all ditches and about 100 feet above mouth of river.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Jan. 22	E. A. Porter	18	14	2.85	37	.....
Apr. 13	Leonard Tanner	16	17	2.42	67	.....
28	.....do	19	20	2.8	93	.....
May 12	.....do	14	13	2.1	51	.....
June 4	.....do	9	3.7	1.3	7.7	0.9
20	.....do	9	3.6	1.28	8.4	.8
July 11	.....do	8	2.5	1.1	3.9	1.6
Aug. 2	.....do	8	3.6	1.4	11	8
9	.....do	.....	.....	.....	.....	.5
14	.....do	12	5.6	1.4	16	3
Sept. 14	.....do	12	5.9	1.5	16	20
Oct. 6	.....do	8	2.8	1.2	5.4	2
Nov. 2	.....do	9	5.0	1.35	14	11
21	.....do	12	8.9	1.6	32	34
Dec. 21	G. C. Baldwin	13	8.0	1.57	27	.....

Daily gage height, in feet, of Santa Clara River near St. George, Utah, for 1910.

[A. W. Burgess, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	2.5	.....	.....	1.3	1.3	1.4	.....	1.2	.....	.....
2	.....	2.8	.....	2.4	2.85	1.35	1.3	1.45	.....	.....	1.35	1.5
3	.....	.....	2.65	.....	.....	1.4	1.4	1.3	1.0	1.15	.....	1.5
4	.....	2.7	.....	2.3	2.6	1.35	1.2	1.4	1.6	.....	1.3	.....
5	.....	2.75	3.0	.....	2.55	1.45	1.15	1.4	.....	1.15	.....	1.5
6	.....	2.8	.....	2.15	2.5	1.35	1.2	1.35	.....	.....	1.4	.....
7	.....	.....	3.25	.....	2.4	1.35	1.3	.....	1.2	1.25	1.4	.....
8	.....	2.7	.....	2.1	2.35	1.25	1.25	1.2	1.2	.....	1.35	.15
9	.....	2.65	3.15	.....	2.35	1.35	1.2	1.2	.....	1.25	1.3	.15
10	.....	.....	.....	2.15	2.15	1.35	1.15	1.85	1.2	.....	.....	.15
11	.....	2.55	3.0	.....	2.2	1.3	1.15	2.0	.....	1.2	1.35	.....
12	.....	.....	.....	2.1	2.1	1.3	1.2	1.5	1.2	.....	.....	1.5
13	.....	2.55	2.85	.....	2.2	1.3	1.15	1.45	.....	.....	.....	.....
14	.....	.....	.....	2.15	2.2	1.25	1.2	.....	1.5	1.2	1.55	1.5
15	.....	2.6	2.95	.....	2.25	1.3	1.2	1.3	.....	1.85	1.45	1.45
16	.....	.....	.....	2.2	2.0	1.35	1.15	1.2	1.35	.....	.....	1.45
17	.....	2.65	3.0	.....	2.0	1.3	1.25	1.15	1.4	1.8	.....	.....
18	.....	.....	.....	2.2	2.25	1.3	1.15	1.2	.....	.....	1.5	.....
19	.....	2.6	3.1	.....	2.2	1.3	1.1	1.15	4.3	1.55	1.6	1.45
20	.....	.....	.....	2.25	2.05	1.35	.....	1.0	1.8	.....	.....	.....
21	2.85	2.55	3.3	.....	2.2	1.5	1.1	.....	.....	1.55	1.6	1.55
22	2.9	.....	.....	2.3	2.0	1.3	1.1	1.0	1.7	.....	.....	1.55
23	2.8	2.5	3.15	.....	2.0	1.25	.....	1.05	1.6	.....	1.55	1.55
24	2.85	.....	.....	2.4	1.95	1.3	1.1	.....	1.55	1.5	.....	1.55
25	2.75	2.45	3.05	.....	1.95	1.2	1.1	1.05	.....	.....	1.6	.....
26	2.8	.....	.....	2.6	1.55	1.25	.....	.....	1.35	.....	1.6	1.55
27	2.9	2.5	3.0	.....	1.45	1.3	1.3	1.0	1.35	1.45	.....	.....
28	2.9	.....	.....	2.75	1.6	1.2	.....	1.0	.....	1.35	1.6	1.55
29	2.9	.....	2.9	.....	1.3	1.3	1.8	1.0	1.25	1.4	1.6	1.55
30	.....	.....	.....	3.0	1.3	1.25	1.95	.....	.....	.....	1.45	1.5
31	2.85	.....	2.6	.....	1.6	.....	1.5	1.0	.....	1.4	.....	.....

Daily discharge, in second-feet, of Santa Clara River near St. George, Utah, for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	36	22	74	102	8	8	11	4.5	6	15	20
2	.....	55	27	67	98	10	8	13	4.5	6	14	21
3	.....	32	32	64	89	11	11	8	4.5	5	13	21
4	.....	30	44	61	80	10	6	11	20	5	12	21
5	.....	32	56	56	76	13	5	11	15	5	14	21
6	.....	35	66	52	73	10	6	10	10	7	16	21
7	.....	32	75	50	67	10	8	8	6	7	16	21
8	.....	30	74	49	64	7	7	6	6	7	14	21
9	.....	28	72	50	64	10	6	6	6	7	12	21
10	.....	25	69	52	52	10	5	34	6	7	13	21
11	.....	22	66	50	55	8	5	43	6	6	14	21
12	.....	22	63	49	49	8	6	21	6	6	17	21
13	.....	22	60	50	55	8	5	18	10	6	20	21
14	.....	24	65	52	55	7	6	15	15	6	24	21
15	.....	25	70	54	58	8	6	12	12	34	18	18
16	.....	26	74	55	43	10	5	9.5	10	36	19	18
17	.....	28	78	55	43	8	7	8.2	11	39	20	18
18	.....	26	84	55	58	8	5	9.5	50	32	21	18
19	.....	25	90	56	43	8	4	8.2	200	24	27	18
20	.....	24	98	58	46	10	4	4.5	31	24	27	21
21	38	22	107	60	55	15	4	4.5	28	24	27	24
22	40	21	104	61	43	8	4	4.5	25	23	26	24
23	35	20	102	64	43	7	4	5.8	20	22	24	24
24	38	19	101	67	40	8	4	5.8	18	21	25	24
25	32	18	100	74	40	6	4	5.8	14	20	27	24
26	35	19	100	80	18	7	6	5.2	10	19	27	24
27	40	20	100	85	13	8	8	4.5	10	18	27	24
28	40	21	98	90	20	6	20	4.5	8	14	27	24
29	40	.....	97	99	8	8	31	4.5	7	16	27	24
30	39	.....	89	108	8	7	40	4.5	7	16	18	21
31	38	.....	81	.....	20	.....	15	4.5	.....	16	.....	21

NOTE.—Daily discharge determined as follows: Jan. 21 to Feb. 28, Aug. 12 to Sept. 3, and Oct. 16 to Dec. 31, from a discharge rating curve fairly well defined; Mar. 1 to 31, by means of indirect method for shifting channels; Apr. 1 to Aug. 11 and Sept. 4 to Oct. 15 from a well-defined curve. Discharge interpolated on days of missing gage heights.

Monthly discharge of Santa Clara River near St. George, Utah, for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January 21–31	.....	.....	37.7	823	B.
February	[a]36	18	25.7	1,430	B.
March	107	22	76.2	4,690	C.
April	108	49	63.2	3,760	A.
May	[a]102	8	50.9	3,130	A.
June	15	6	8.73	519	A.
July	40	4	8.48	521	A.
August	43	4.5	10.3	633	B.
September	200	[a]4.5	19.4	1,150	B.
October	39	5	15.6	959	B.
November	27	12	20.0	1,190	B.
December	24	18	21.4	1,320	B.
The period	.....	.....	.....	20,100	

[a] Interpolated.

MUDDY RIVER AT MOAPA, NEV.

This station, which is located just below the Narrows about 7 miles from Moapa, was originally established January 1, 1904, near the crossing of the San Pedro, Los Angeles & Salt Lake Railroad, about 6 miles downstream from Moapa, Nev., and above the Narrows. It was removed to the present site, 1½ miles below the old station, January 1, 1909.

Discharge measurements are made in a flume, which carries the entire flow of the river except during floods produced by cloudbursts.

Discharge measurements of Muddy River near Moapa, Nev., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 7	E. C. La Rue	7.8	9.0	1.12	36.1
29	A. L. MacDermott	8	11.2	1.4	48.0

Daily gage height, in feet, of Muddy River near Moapa, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1						1.94		1.38		
2							1.61			
3					2.00	1.83				
4					1.95			1.58		
5							1.55	1.45		
6					2.05					
7						1.78				
8							1.42	1.30	1.18	
9					2.05			1.30		
10					2.05	1.46		1.54		1.15
11							1.45			
12							1.48	2.25	1.18	
13	2.35				1.99	1.53		1.60		
14							1.51			1.17
15	2.25					1.60		1.34		
16					2.00		1.53			
17									1.25	1.21
18					2.00		1.45	1.33		
19						1.50	1.50	1.35		
20					1.95			1.38		1.25
21									1.20	
22				2.30		1.45	1.48			
23					1.93			1.42	1.15	1.24
24										
25				2.01	1.85	1.38	1.50		1.10	
26										1.21
27				2.04	1.80				1.10	
28						1.48	1.43	1.08		1.22
29				2.08	1.88				1.15	
30						1.50	1.42			
31								1.10		1.18

Daily discharge, in second-feet, of Muddy River near Moapa, Nev., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1					100	92	64	52	35	37
2					98	88	68	57	35	37
3					97	83	67	62	35	37
4					93	82	65	66	35	37
5					97	81	64	56	37	37
6					101	81	60	52	37	37
7					101	80	57	49	37	37
8					101	70	54	46	39	37
9					101	65	55	46	39	37
10					101	57	55	63	39	37
11					100	58	56	90	39	37
12					98	60	59	118	39	37
13					96	62	60	67	40	37
14					96	65	61	60	40	38
15					97	67	61	49	41	39
16					97	66	62	49	42	40
17					97	64	59	48	43	41
18					97	62	56	48	42	41
19					95	60	60	50	41	42
20					93	58	60	52	40	43
21					93	58	59	53	40	42
22				122	92	56	59	53	39	42
23				112	91	55	59	54	37	42
24				105	88	53	60	50	35	42
25				98	85	52	60	48	34	41
26				99	83	54	59	43	34	41
27				100	81	56	57	38	34	41
28				102	84	59	55	33	35	41
29				103	87	60	54	33	37	41
30				102	89	60	54	34	37	40
31					91		53	34		39

NOTE.—These discharges are based on a rating curve that is fairly well defined. For days of no gage height the discharge is interpolated.

Monthly discharge of Muddy River near Moapa, Nev., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 22-30	122	98	105	1,870	B.
May	101	81	94.2	5,790	B.
June	92	52	65.5	3,900	B.
July	68	53	59.1	3,630	B.
August	118	33	53.3	3,280	B.
September	43	34	37.9	2,260	B.
October	43	37	39.3	2,420	B.
The period				23,200	

BILL WILLIAMS RIVER NEAR SWANSEA, ARIZ.

Bill Williams River rises in the St. Cloud Mountains, in the western part of Yavapai County, Ariz., and flows westward to its junction with the Colorado at Aubrey Landing.

The station, which is located at a narrow place in the canyon, about 1 mile below the Planet mine, 28 miles north of Bouse, and about 9 miles northwest of Swansea, the nearest post office, was established September 26, 1910.

No water is diverted above the station, but water is pumped from wells for irrigation on several ranches along the river.

The staff gage is in three sections. The low-water section is fastened to a cottonwood tree on the right bank; the remainder of the gage is bolted to the rocks on the left bank.

The channel is straight for several hundred feet above and below the station. At the gage the canyon is narrow and the banks are high and rocky. The bed of the stream is composed of sand, which is constantly shifting.

Discharge measurements at low water are made by wading near the gage. High-stage measurements will be made by means of car and cable not yet installed.

Discharge measurements of Bill Williams River near Swansea, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 26[a]	C. C. Jacob	31	12	2.85	17
Nov. 30[b]	do	23	9.9	2.62	17

[a] Made by wading at gage. River in two channels.
[b] Made by wading 100 feet below gage; river at gage was in two channels.

Daily gage height, in feet, of Bill Williams River near Swansea, Ariz., for 1910.

[L. G. Martinez, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	2.85	2.45	2.6	11			2.6	21			2.5
2	2.7		2.6	12	3.2		2.6	22	2.7		2.5
3	2.8	2.45	2.6	13	2.8		2.6	23			2.5
4		2.6	2.6	14			2.6	24	2.7		2.5
5			2.6	15	2.8		2.6	25			2.5
6	2.85		2.6	16	2.75		2.6	26			2.5
7			2.6	17	2.75		2.6	27	2.6		2.5
8			2.6	18			2.6	28			2.5
9	2.8		2.6	19			2.6	29	2.6		2.5
10	2.7		2.6	20	2.7		2.5	30			2.5
								31			2.5

NOTE.—Observer absent Nov. 5 to 30.

GILA RIVER BASIN.

GENERAL FEATURES.

Gila River rises in southwestern New Mexico, near the Arizona line, and flows southwestward through Arizona to its confluence with Colorado River at Yuma. Its total length, exclusive of the many windings, is fully 500 miles. The principal tributaries of the Gila are San Pedro and Santa Cruz rivers from the south and Salt, Agua Fria, and Hassayampa rivers from the north.

The floods of the upper Gila and its tributaries are commonly short and violent, highest water occurring during the months of Janu-

ary and February. A period of high water occurs also during the late summer or early fall. During freshets the river may rise 8 to 10 feet above the normal stage and increase in width from 300 feet to a mile and a half. It is sometimes impassable for weeks and has the appearance of a sea of muddy water. The season of low water occurs in June and July, the river bed then being dry in places. Elevations in this basin range from 8,000 feet at the headwaters to 140 feet at Yuma. At Florence, 180 miles below the point at which it enters Arizona, it is about 1,500 feet above sea level.

Good storage sites exist at several places along San Francisco and Gila rivers, among which may be mentioned the reservoir site on the San Francisco near Alma and that on the Gila near Redrock, N. Mex.

Because of the torrential character of the Gila, waterpower development is not feasible except where stored water is used.

The drainage basin of the Gila includes 7,000 square miles of merchantable timberland, 11,000 square miles of woodland, of which the San Francisco basin has 1,000 square miles of timberland, 45,000 square miles of land upon which there is no timber, 1,300 square miles of scattered timber, and 300 square miles of open land.

The average annual precipitation over the greater part of the contributary drainage area of Gila and San Francisco rivers in New Mexico is between 10 and 15 inches, and in the high mountains of the headwater region it rises above 20 inches. The winters are mild except in the mountainous sections, and very little ice forms on the rivers.

GILA RIVER NEAR REDROCK, N. MEX.

This station, which is located in Middle Box Canyon, about one-eighth mile upstream from the mouth and about 2 miles east of Redrock post office, N. Mex., was originally established at the mouth of the canyon May 14, 1908. It was moved to its present site July 16, 1909. The nearest railroad points are Silver City, about 36 miles east of Redrock, and Lordsburg, about 30 miles south.

Mancos River, an intermittent stream, the first large tributary upstream from the station, joins the Gila about 12 miles above. A number of large washes come into the river above and below the station, and at flood times carry a large amount of water. The drainage area at the station is about 3,500 square miles. A number of large irrigation ditches divert water above the station.

The gage installed May 14, 1908, was bolted to a rock bluff on the left bank, a few feet above the mouth of the canyon. This gage was abandoned July 16, 1909, when a Friez automatic gage was installed on the left bank about one-eighth mile upstream and at a different datum. The bed of the stream is composed of sand, which is con-

tinually shifting, and measurements by wading are rendered more or less difficult and of uncertain accuracy by quicksand.

Except for fringe ice along the edges of the stream, the relation between gage height and discharge is not affected by ice.

The accuracy of the records derived from observations at this station is impaired by the adverse natural conditions.

Discharge measurements of Gila River near Redrock, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	J. B. Stewart	74	69	1.65	107
Mar. 20	.....do	42	55	1.55	88
20	.....do	49	55	1.55	80
20	.....do	22	27	1.55	84
21	.....do	30	48	1.55	91
22	.....do	31	44	1.52	82
May 10	C. D. Miller	49	51	1.70	66
July 3	J. B. Stewart	36	27	1.05	29
Sept. 13	.....do	34	29	1.45	36
Nov. 20	.....do	27	34	1.90	79

Daily gage height, in feet, of Gila River near Redrock, N. Mex., for 1910.

[J. L. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.65	1.65	1.6	1.8	1.7	.....	1.1	.....	.....	1.6	1.7	1.85
2	1.7	1.65	1.6	1.7	1.7	.....	1.1	.....	.....	1.6	1.7	1.8
3	1.7	1.65	1.6	1.7	1.65	.....	1.05	.....	2.0	1.65	1.7	1.8
4	1.85	1.65	1.6	1.7	1.6	1.75	1.0	.....	.....	1.7	1.75	1.8
5	1.95	1.65	1.5	1.7	1.6	1.65	1.0	.....	.....	1.7	1.9	1.8
6	1.85	1.65	1.5	1.65	1.6	1.55	1.0	1.0	.....	1.7	1.85	1.8
7	1.8	1.65	1.5	1.6	1.6	1.5	.8	.....	.....	1.7	1.85	1.8
8	1.75	1.65	1.5	1.65	1.65	1.45	.8	.....	.....	1.7	1.85	1.8
9	1.7	1.65	1.5	1.7	1.65	1.4	.8	.....	.....	1.6	1.85	1.8
10	1.7	1.65	1.5	1.75	1.6	1.3	.8	2.8	1.5	1.65	1.85	1.8
11	1.7	1.65	1.5	1.8	1.55	1.2	.95	.....	1.45	1.65	1.85	1.8
12	1.8	1.65	1.4	1.8	1.55	1.2	.9	.....	1.45	1.65	1.85	1.8
13	1.9	1.65	1.4	1.8	1.5	1.15	2.05	.8	1.45	1.65	1.85	1.8
14	2.0	1.65	1.5	1.8	1.5	1.1	1.7	.....	1.45	1.65	1.9	1.8
15	2.0	1.65	1.5	1.8	1.5	1.1	1.5	.....	1.4	1.7	1.95	1.8
16	1.95	1.6	1.5	1.8	1.5	1.05	2.5	.....	1.4	1.7	1.95	1.8
17	1.95	1.6	1.5	1.8	1.5	1.05	1.2	.....	1.5	1.7	1.9	1.8
18	2.0	1.6	1.5	1.8	1.5	1.0	.....	2.5	1.45	1.7	1.9	1.8
19	2.0	1.65	1.5	1.7	1.5	.95	.....	.....	1.55	1.7	1.85	1.8
20	2.0	1.65	1.55	1.7	1.5	.95	.....	1.2	1.6	1.7	1.85	1.8
21	2.0	1.65	1.55	1.65	1.4	.95	.....	.....	1.6	1.75	1.85	1.8
22	2.0	1.65	1.55	1.6	1.4	.95	.....	.....	1.65	1.7	1.85	1.8
23	2.0	1.7	1.6	1.5	1.45	.95	1.2	.....	1.65	1.7	1.85	1.8
24	2.0	1.65	1.6	1.6	1.45	.95	.....	.....	1.6	1.7	1.85	1.8
25	2.0	1.6	1.6	1.7	1.45	.95	.....	.....	1.6	1.7	1.85	1.8
26	2.0	1.65	1.65	1.7	1.45	1.05	.....	.....	1.6	1.7	1.85	1.8
27	2.0	1.65	1.7	1.7	1.45	1.15	.....	1.8	1.55	1.7	1.85	1.8
28	2.0	1.65	1.7	1.7	1.45	1.5	.....	.....	1.55	1.7	1.85	1.8
29	1.95	.....	1.7	1.7	.....	1.3	.....	.....	1.6	1.7	1.85	1.8
30	1.95	.....	1.75	1.7	.....	1.25	1.8	.....	1.6	1.7	1.85	1.8
31	1.95	.....	1.8	.....	.....	.....	.....	.....	.....	1.7	.....	1.8

Daily discharge, in second-feet, of Gila River near Redrock, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	114	107	95	118	71	65	30	28	52	49	60	85
2	123	107	95	98	71	70	30	28	52	49	60	80
3	123	107	95	98	65	75	29	28	73	52	60	81
4	154	107	95	98	61	80	28	28	60	56	60	82
5	176	107	79	96	61	68	28	28	50	56	82	83
6	152	107	79	87	60	59	28	28	50	56	75	83
7	141	107	79	80	60	55	27	28	40	56	75	84
8	128	107	79	85	63	52	27	28	40	57	75	85
9	118	107	79	90	62	49	27	28	40	50	76	86
10	118	107	79	98	58	44	27	240	39	53	76	87
11	118	107	78	104	55	40	28	28	38	53	76	88
12	139	107	67	104	55	40	28	28	37	54	76	89
13	162	107	67	102	53	39	78	27	36	54	76	90
14	185	107	78	102	53	37	48	28	36	55	80	91
15	185	107	78	100	53	37	40	28	36	58	87	92
16	173	97	78	100	53	36	164	28	36	58	87	93
17	173	97	77	100	53	36	32	28	38	58	79	94
18	185	97	77	98	53	35	32	162	38	58	79	95
19	185	105	77	82	53	34	32	34	42	58	73	96
20	185	105	84	81	53	34	32	32	44	58	73	97
21	185	105	91	74	49	34	32	32	44	63	73	98
22	185	105	82	67	49	34	32	32	48	59	74	99
23	185	114	90	57	51	34	32	32	48	59	76	100
24	185	104	90	65	51	34	34	32	46	59	77	101
25	185	96	89	74	51	34	34	32	46	59	78	102
26	185	104	96	74	51	32	34	42	47	59	79	103
27	185	104	104	74	51	34	36	55	45	59	80	104
28	185	104	104	72	51	41	42	52	45	60	81	105
29	173	.....	104	71	51	36	48	52	47	60	82	106
30	173	.....	111	71	55	35	55	52	49	60	84	107
31	173	.....	120	.....	60	.....	50	52	.....	60	.....	108

NOTE.—These discharges obtained by use of indirect method for shifting channels. Discharges estimated for periods when automatic gage records are missing or of no value, due to sand.

Monthly discharge of Gila River near Redrock, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	185	114	162	9,960	D.
February	114	96	105	5,830	C.
March	120	67	87.0	5,350	C.
April	118	57	87.3	5,190	C.
May	71	49	56.0	3,440	C.
June	80	32	44.4	2,640	D.
July	164	27	39.5	2,430	D.
August	240	28	44.5	2,740	D.
September	73	36	44.7	2,660	C.
October	63	49	56.6	3,480	C.
November	87	60	75.6	4,500	C.
December	108	80	93.4	5,740	D.
The year	240	27	74.6	54,000	

GILA RIVER NEAR GUTHRIE, ARIZ.

This station, which is located above the Arizona & New Mexico Railway bridge (see Pl. III, *B*, p. 34) at Guthrie, in sec. 3, T. 6 S., R. 30 E., Gila and Salt River base and meridian, was established November 6, 1910.

No important tributaries enter for several miles above the station. San Francisco River adjoins Gila River 8 miles below. Approximately 7,000 acres are irrigated above Guthrie. Water is also diverted for irrigation below the station. Two reservoir sites in the vicinity of the station have been investigated—one at Guthrie and the other near the mouth of San Francisco River.

The gage is an inclined staff bolted to the conglomerate bluff on the right bank about 500 feet above the railroad bridge.

The channel is straight for some distance above and below the station. The right bank is high and rocky; the left bank is lower, is covered with brush, and is subject to overflow at extreme high water. The bed of the stream is composed of shifting sand and silt.

High-stage measurements are made from a car and cable 50 feet below the gage. At lower stages measurements are made by wading above the gage, as the current at the cable section is very sluggish.

Discharge measurements of Gila River at Guthrie, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 26	C. C. Jacob	31	28	5.28	63
Nov. 18	do	33	32	5.50	92
Dec. 17	do	32	29	5.48	72

NOTE.—Measurements made by wading 600 feet above gage.

Daily gage height, in feet, of Gila River at Guthrie, Ariz., for 1910.

[Miss Amelia Short, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		5.3	11	5.25	5.5	21	5.4	5.35
2		5.3	12	5.25	5.5	22	5.45	5.35
3		5.3	13	5.25	5.5	23	5.35	5.3
4		5.4	14	5.4	5.4	24	5.3	5.3
5		5.4	15	5.5	5.4	25	5.3	5.3
6	5.2	5.4	16	5.6	5.4	26	5.3	5.3
7	5.2	5.4	17	5.6	5.4	27	5.4	5.3
8	5.4	5.4	18	5.55	5.4	28	5.4	5.3
9	5.3	5.5	19	5.5	5.35	29	5.4	5.3
10	5.3	5.5	20	5.5	5.35	30	5.4	5.3
						31		5.3

GILA RIVER AT SAN CARLOS, ARIZ.

This station, which is located at the Arizona & Eastern Railroad bridge, about 1 mile east of San Carlos on the San Carlos Indian Reservation, was established August 17, 1910. From 1899 to 1905 a gaging station was maintained on Gila River at San Carlos, about 1 mile below the present station.

San Carlos River enters from the north about one-half mile below the station. No other important tributaries enter within several miles above or below San Carlos.

The original gage was a vertical staff fastened to the west pier of the railroad bridge. On September 7, 1910, a gage, with independent datum, was installed at the old railroad trestle about 200 yards below the bridge. A curve of relation was determined for these gages, and all gage heights for 1910 are referred to the datum of the new gage.

The channel has a slight curve above the station, but is straight for 1,500 feet below. Both banks are high and not subject to overflow. The bed of the stream is wide and composed of shifting sand.

Discharge measurements are made from the railroad bridge, except at low water, when they may be made by wading.

Discharge measurements of Gila River at San Carlos, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage on pier.	Gage on railroad bridge.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
Aug. 17[a]	C. C. Jacob	6	4.8	10.30	.....	6.5
Aug. 30[b]	.....do	145	298	11.20	1.0	269
30[b]	.....do	149	437	11.90	1.9	1,700
Sept. 1[b]	.....do	174	134	11.30	1.1	237
3[b]	.....do	120	63	11.00	.8	84
6[b]	.....do	97	53	10.90	.7	61
Dec. 2[c]	.....do	39	41	[d]11.09	.....	83
19[e]	.....do	36	23	10.98	.75	45

[a] Made by wading 100 feet above bridge.
[b] Made at railroad bridge.
[c] Made at Winkleman.
[d] Average gage height (observer's) for three days previous taken as mean gage height of measurement.
[e] Made by wading about 1,000 feet above bridge.

NOTE.—All gage heights refer to new gage installed Sept. 7, 1910.

Daily gage height, in feet, of Gila River at San Carlos, Ariz., for 1910.

[J. B. Stone, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	11.2	10.4	10.4	11.0	16	.....	10.4	10.4	10.8	10.9
2	.....	11.1	10.4	10.4	11.0	17	11.4	10.4	10.4	10.8	10.9
3	.....	10.8	10.4	10.4	11.0	18	.....	10.4	10.4	10.8	10.9
4	.....	11.0	10.4	10.8	11.0	19	13.5	10.4	10.4	10.8	11.0
5	.....	10.9	10.4	11.1	11.0	20	11.6	10.4	10.4	10.8	11.0
6	.....	10.9	10.4	10.9	11.0	21	11.4	10.4	10.4	10.8	11.0
7	.....	10.9	10.4	10.7	11.0	22	11.3	10.6	10.4	10.8	11.0
8	.....	10.9	10.4	10.7	11.0	23	11.6	10.5	10.4	10.8	11.0
9	.....	10.8	10.4	10.7	10.9	24	.....	10.5	10.4	10.8	11.0
10	.....	10.7	10.4	10.6	10.9	25	11.1	10.4	10.4	10.8	11.0
11	.....	10.6	10.4	10.6	10.9	26	11.0	10.4	10.4	10.8	11.0
12	.....	10.6	10.4	10.6	10.8	27	11.2	10.4	10.4	11.4	11.0
13	.....	10.6	10.4	10.6	10.8	28	10.9	10.4	10.4	11.4	11.0
14	.....	10.5	10.4	10.95	10.8	29	11.5	10.4	10.4	11.2	10.9
15	.....	10.5	10.4	10.8	10.8	30	11.6	10.4	.....	11.2	10.9
						31	11.2	.....	.....	.....	10.9

NOTE.—All gage heights refer to new gage installed on bent of old railroad trestle Sept. 7, 1910, at an arbitrary datum. All gage heights prior to this date have been reduced to this datum by a relative curve constructed from simultaneous readings of the gage at the railroad bridge and the new gage.

SAN FRANCISCO RIVER BASIN.

GENERAL FEATURES.

San Francisco River rises in the southwestern part of Socorro County, N. Mex., and flows southwestward into Graham County, Ariz., where it unites with the Gila. The basin comprises about 2,600 square miles, of which 1,800 square miles are in New Mexico and 800 in Arizona. The area drained in New Mexico is high and mountainous, the principal ranges being the San Francisco and Tularosa and the western slope of the Mogollon, with peaks ranging from 8,000 to 10,000 feet above sea level. The average fall of the stream is 35 to 40 feet to the mile. The side slopes of the valley descend even more steeply and the valleys below, which range in length from 2 to 3 miles and average about a quarter of a mile in width, are of the nature of mesa lands, the leveler portions being 30 to 100 feet below the bed of the river. The principal tributaries of the San Francisco are Blue and Tularosa rivers. The waters of the San Francisco and its tributaries are used to some extent for mining, and a few small ditches take water for irrigation on the bottom lands.

SAN FRANCISCO RIVER AT ALMA, N. MEX.

This station, which is located about half a mile southeast of Alma, N. Mex., a short distance below the mouth of Mineral Creek, about 5 miles above the mouth of Whitewater Creek, and 85 miles northwest of Silver City, the most accessible railway point, was established October 18, 1904, by the United States Reclamation Service, discontinued December 31, 1907, and reestablished by the United States Geological Survey January 1, 1909.

A few small ditches take water out above the station for the irrigation of the bottom lands.

The rod gage established in 1909 differs in location and datum from the previous gage. It was washed out September 6, 1909, and replaced October 10, 1909, by another slope gage 100 feet upstream but at the same datum. In the intervals between regular gages, observations were made on a temporary gage installed by the observer and later reduced to the datum of the new gage.

High-water measurements have been made from a cable 300 feet upstream from the location of the last gage. (See Pl. IV, *A*.) The flow of the stream is very little affected by ice, though thin ice sometimes forms on the edges.

As the channel of the stream is composed of materials that shift, it is necessary to make frequent discharge measurements in order to obtain good results.

Discharge measurements of San Francisco River at Alma, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 11	J. B. Stewart	34	14	0.96	28
Mar. 26	do	25	9.4	1.30	16.2
May 6	C. D. Miller			1.30	(a)
Sept. 17	J. B. Stewart	22	6.2	1.95	7.8
Nov. 17	do	30	11	2.03	23.4

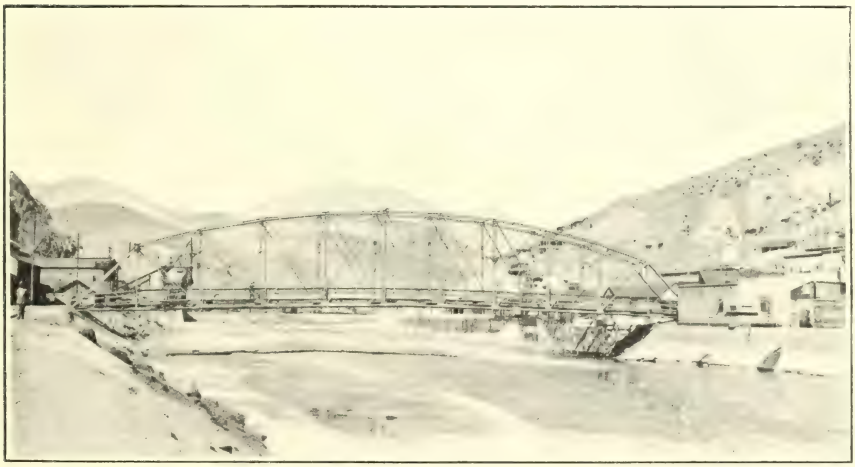
a River dry.

Daily gage height, in feet, of San Francisco River at Alma, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.05	1.05	1.05	1.25				1.45	1.9	1.95	1.95	2.0
2	1.05	1.05	1.05	1.25				1.5	2.0	1.95	1.95	1.95
3	1.05	1.05	1.05	1.2				1.7	1.0	1.95	1.95	2.05
4	1.05	1.05	1.05	1.2				1.5	.9	1.95	1.95	2.0
5	1.05	1.05	1.05	1.3				1.25	.9	1.95	1.95	2.0
6	1.05	1.05	1.05	1.3				1.25	.9	1.95	1.95	2.0
7	1.05	1.05	1.05	1.35				1.25	.9	1.95	1.95	2.0
8	1.05	1.05	1.05	1.5				1.2	.9	1.95	1.95	2.0
9	1.05	1.05	1.05	1.5				1.2	.9	1.95	1.95	1.95
10	1.05	1.05	1.2	1.6				.9	.9	1.95	1.95	2.0
11	1.05	.9	1.25	1.45				1.0	.9	1.95	1.95	2.0
12	2.0	.9	1.2	1.5				1.05	.9	1.95	1.95	2.0
13	2.0	.9	1.15	1.55				1.1	.9	1.9	1.95	2.0
14	1.55	.9	1.2	1.5				1.05	.95	1.9	1.95	2.0
15	1.25	.9	1.2	1.5				.9	.95	1.9	1.95	2.0
16	1.15	.9	1.2	1.5				.9	.9	1.95	1.95	2.0
17	1.05	.9	1.2	1.4				.9	1.95	2.0	2.0	2.0
18	1.05	1.0	1.2	1.4				.9	1.95	2.0	1.95	2.0
19	1.05	.9	1.2	1.35				.9	2.0	1.95	1.95	2.0
20	1.05	.9	1.2	1.35				1.0	2.5	1.95	1.95	2.05
21	1.05	.9	1.2	1.2				1.0	2.75	1.9	1.95	2.15
22	1.05	.9	1.2	1.2				1.0	1.95	1.9	1.95	2.0
23	1.05	.9	1.2	1.25			2.0	1.1	1.95	1.9	1.9	2.0
24	1.05	.9	1.2	1.3			1.1	1.3	1.95	1.9	1.9	2.0
25	1.05	.9	1.25	.9			1.1	1.7	1.95	1.9	1.9	2.0
26	1.05	1.05	1.3	.9			.9	2.25	1.95	1.9	1.95	2.05
27	1.05	1.05	1.25	.9			.9	2.5	1.95	1.9	2.3	2.05
28	1.05	1.05	1.25	.9			1.25	1.6	1.95	1.9	2.0	2.0
29	1.05		1.25	1.3			.95	2.9	1.95	1.9	2.0	2.0
30	1.05		1.25	1.25			.9	2.5	1.95	1.95	2.0	1.95
31	1.05		1.25				1.25	2.0		1.95		1.95

NOTE.—Stream bed continually shifting away from the slope gage. Auxiliary gages set on Sept. 17 and Nov. 17. Gage heights July 23 to Sept. 17 are very uncertain. No flow during May, June, and July except July 23.

A. TYPICAL GAGING CAR FOR CABLE STATION.



B. GAGING STATION ON SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

Daily discharge, in second-feet, of San Francisco River at Alma, N. Mex., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	38	36	22	11	0	0	0	0	7.0	12	16	21
2	38	36	20	11	0	0	0	.5	12	12	16	18
3	38	36	20	9	0	0	0	3.0	0	12	16	24
4	38	36	20	9	0	0	0	.5	0	12	16	22
5	38	36	19	14	0	0	0	0	0	12	16	22
6	38	36	19	14	0	0	0	0	0	12	16	22
7	38	36	18	16	0	0	0	0	0	12	16	22
8	38	36	18	25	0	0	0	0	0	12	16	22
9	38	36	18	25	0	0	0	0	0	12	16	20
10	38	36	30	32	0	0	0	0	0	13	16	24
11	38	24	34	20	0	0	0	0	0	13	16	24
12	370	24	30	24	0	0	0	0	0	14	16	24
13	370	23	22	26	0	0	0	0	0	11	16	24
14	132	22	26	22	0	0	0	0	0	11	16	24
15	59	22	26	22	0	0	0	0	0	11	16	24
16	46	21	24	21	0	0	0	0	0	14	18	24
17	36	20	24	15	0	0	0	0	8	17	21	24
18	36	27	22	15	0	0	0	0	8	17	18	24
19	36	19	22	10	0	0	0	0	10	14	18	24
20	36	19	22	10	0	0	0	0	50	14	18	30
21	36	18	20	4	0	0	0	0	98	12	18	39
22	36	18	20	4	0	0	0	0	9	12	18	26
23	36	17	20	4	0	0	17	0	9	12	15	26
24	36	16	17	5	0	0	0	0	10	12	15	26
25	36	15	18	0	0	0	0	2.0	10	12	15	26
26	36	25	16	0	0	0	0	30	10	12	18	32
27	36	24	12	0	0	0	0	56	10	12	48	32
28	36	23	12	0	0	0	0	.5	10	12	21	28
29	36	.....	12	3	0	0	0	160	11	12	21	28
30	36	.....	12	2	0	0	0	56	11	16	21	24
31	36	.....	12	.....	0	.....	0	13	.....	16	.....	24

NOTE.—Daily discharge determined by the indirect method for shifting channels and is rather uncertain, especially from July 23 to Sept. 17, on account of gage heights.

Monthly discharge of San Francisco River at Alma, N. Mex., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	370	36	62.4	3,840	C.
February	36	15	26.3	1,460	C.
March	34	12	20.2	1,240	C.
April	32	0	12.4	738	D.
May	0	0	0	0	
June	0	0	0	0	
July	17	0	.5	31	D.
August	160	0	10.4	640	D.
September	98	0	9.4	559	D.
October	17	11	12.8	787	C.
November	48	15	18.1	1,080	C.
December	39	18	25	1,490	C.
The year	370	0	16.5	11,900	

SAN FRANCISCO RIVER AT CLIFTON, ARIZ.

This station, which is located at the highway bridge at Clifton (see Pl. IV, *B*), in sec. 19, T 4 S., R. 30 E, Gila and Salt River base and meridian, about 5 miles above the mouth of the river and below all important tributaries, was established October 24, 1910.

Water is diverted for irrigation by a small ditch 1¾ miles above the bridge. At the dam of the Arizona Copper Co., 1½ miles above

Clifton, about 14 second-feet is diverted for power development, but the water used at the power plant is returned to the river above the station.

The gage is a vertical staff fastened to the board retaining wall just above the bridge.

The bed is sandy and somewhat shifting. The banks are high and not likely to be overflowed. At very low stages there are two channels at the bridge.

High-water measurements are made from the highway bridge. At medium and low stages measurements may be made either from the footbridge one-half mile below the gage or from the footbridge one-fourth mile above. When made at the upper footbridge the discharge of the canal must be added to that of the river.

Discharge measurements of San Francisco River at Clifton, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Oct. 23[a]	C. C. Jacob	48	33	5.35	68
24[b]	do	27	32		59
24	do			5.35	[c]73
Nov. 17[b]	do	31	39		93
17	do			5.80	[c]112
Dec. 16[b]	do	27	32		52
16	do			5.60	[c]66
16[b]	do	29	37		66
16	do			5.65	[c]81

[a] Made from footbridge ½ mile below gage.
[b] Made from footbridge ¼ mile above gage. There is inflow between this measuring section and the gage section that has to be added to give the total flow past the gage.
[c] Total flow past gage. Includes flow in river, discharge from canal of Arizona Copper Co., and inflow from Chase Creek.

NOTE.—The canal of Arizona Copper Co. discharged 14 second-feet back into river above gage, amount determined by measurement Dec. 16. This amount is practically constant. On Nov. 17 Chase Creek discharged 5.3 second-feet.

Daily gage height, in feet, of San Francisco River at Clifton, Ariz., for 1910.

[Peter Riley, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		5.5	5.5	11		5.6	5.5	21		5.7	5.7
2		5.5	5.5	12		5.6	5.5	22		5.7	5.6
3		5.6	5.5	13		5.6	5.5	23		5.6	5.6
4		5.7	5.5	14		5.6	5.5	24	5.35	5.6	5.6
5		5.8	5.5	15		5.65	5.5	25	5.3	5.6	5.7
6		5.7	5.5	16		5.85	5.65	26	5.4	5.6	5.7
7		5.7	5.5	17		5.9	5.65	27	5.5	5.6	5.6
8		5.65	5.5	18		5.8	5.6	28	5.5	5.6	5.6
9		5.6	5.5	19		5.7	5.7	29	5.55	5.6	5.6
10		5.6	5.5	20		5.7	5.7	30	5.6	5.6	5.6
								31	5.5		5.6

WHITEWATER CREEK NEAR MOGOLLON, N. MEX.

A weir was installed by the Socorro Mines Co. on Whitewater Creek about half a mile above the power house, a few miles from Mogollon, N. Mex.—a town about 85 miles north of Silver City—in September, 1909.

The data given herewith are published through the courtesy of the company.

Discharge measurements of Whitewater Creek near Mogollon, N. Mex., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 27	Stewart and Tower	12.3	7.9	2.90	9.6
Sept. 18	.....do	11.7	4.7	3.50	2.7
Nov. 16	J. B. Stewart	9.5	4.3	3.16	3.2

Daily discharge, in second-feet, of Whitewater Creek near Mogollon, N. Mex., for 1909–10.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1909.				1909.				1909.			
1	4.4	3.3	3.3	11	3.9	3.3	4.7	21	3.6	3.3	3.5
2	4.4	3.3	3.3	12	3.9	3.3	5.1	22	3.6	3.3	3.7
3	4.4	3.3	5.1	13	3.9	3.3	5.1	23	3.6	3.3	3.6
4	4.4	3.3	4.1	14	3.9	3.3	4.1	24	3.5	3.3	3.9
5	4.1	3.3	2.7	15	3.9	3.3	3.3	25	3.3	3.3	3.9
6	4.0	3.3	2.7	16	3.5	3.3	3.3	26	3.3	3.3	3.9
7	3.9	3.3	2.7	17	3.3	3.3	3.3	27	3.3	4.3	3.5
8	3.9	3.3	2.7	18	3.5	3.3	3.3	28	3.3	5.6	3.9
9	3.9	3.3	2.7	19	3.6	3.3	3.3	29	3.3	3.9	3.6
10	3.9	3.3	2.9	20	3.6	3.3	2.5	30	3.3	3.6	3.6
								31	3.3	.....	3.5

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.												
1	11	6	4.3	6.7	20	3.6	2.8	3.7	5.3	2	2.1	3.3
2	19	6	4.7	7.7	17	2.8	2.1	2.9	3.7	1.7	2.1	3.2
3	14	6	5.3	5.3	15	3.7	1.7	3.1	3.6	2.1	2.1	2.6
4	6.7	6	6.4	5.3	15	3.9	1.6	3.2	2.9	2.1	2.1	2.6
5	5.2	6	7.5	5.1	14	2.9	1.6	2.9	3.9	2.1	2.9	2.6
6	5.2	5	7.7	5.1	14	2.8	1.6	2.4	2.9	2.1	3.3	2.6
7	5.2	5	8.5	6.7	12	2.8	1.6	2.4	2.8	2.0	3.3	2.6
8	5.2	5	9.6	8.0	12	2.8	1.6	2.4	2.8	1.6	3.2	2.6
9	5.2	5	9.2	8.1	10	2.4	1.6	2.4	2.4	1.6	2.6	2.6
10	5.6	5	9.7	9.7	10	2.3	1.6	3.7	2.1	1.6	2.6	2.6
11	6.5	5	9.7	13	10	2.1	1.6	6.5	2.1	1.7	2.4	2.6
12	13	5	8.7	12	10	2.1	2.4	5.2	2.1	2	2.1	2.6
13	13	5	7.7	14	9.7	2.1	4	3.5	2.1	1.6	2.1	2.6
14	8.9	4.5	8	16	9.5	2.1	4	2.4	2.1	1.6	2.2	2.6
15	8.7	4.5	8.3	15	9.2	2.1	4	2.1	1.7	1.6	2.9	2.6
16	8.9	4.5	7.7	14	8.5	2.1	4.1	2.4	1.6	1.6	3.3	2.6
17	9.7	4.5	8.3	13	8	2.1	4.4	2.1	1.6	1.7	3.3	2.6
18	9.3	4.5	9.1	12	7.6	2.1	4.4	2.8	2.6	2.1	3.2	2.6
19	8	4.3	9.3	15	7.1	1.9	4	2.9	2.5	2.1	2.6	2.6
20	7.9	4.3	9.5	19	6	1.9	2.4	2.9	3.4	2.2	2.6	2.6
21	7.7	4.3	9.2	24	6	1.9	2.4	2.8	3.3	2.6	2.6	2.6
22	6.4	4.3	10	23	5.3	1.6	2.1	2.4	3.3	2.6	2.6	2.6
23	6.1	4.4	11	19	5.2	1.6	2.1	2.4	3.3	2.6	2.6	2.6
24	6	4.9	12	15	4.4	1.6	2.8	2.4	3.3	2.6	2.6	2.6
25	6	4.3	12	17	4.3	1.6	3.7	2.1	2.9	2.5	2.6	2.6
26	6	4.7	10.4	17	4.3	1.6	2.9	2.4	2.1	2.7	2.6	2.6
27	6	5.1	9.7	18	3.7	2.7	3.1	2.1	2.2	2.1	2.9	2.6
28	6	4.7	9.1	20	3.7	3.7	2.9	2.4	2.5	2.1	4.2	2.6
29	6	.....	7.7	21	3.7	3.7	2.9	3.7	2.1	2.1	4	2.6
30	6	.....	7.7	22	3.7	3.2	4	5.7	2.1	2.1	3.3	2.6
31	6	.....	7.5	.....	3.5	.....	4	6	.....	2.1	.....	2.6

NOTE.—These discharges were obtained from a hydrograph showing the available horsepower. This hydrograph was constructed by the Socorro Mines Co. from daily readings made by that company.

Monthly discharge of Whitewater Creek near Mogollon, N. Mex., for 1909-10.

Month.	Discharge in second feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
1909.				
October	4.4	3.3	3.73	229
November	5.6	3.3	3.44	205
December	5.1	2.5	3.57	220
1910.				
January	19.0	5.2	7.88	485
February	6.0	4.3	4.92	273
March	12.0	4.3	8.56	526
April	24.0	5.1	13.6	809
May	20.0	3.5	8.79	540
June	3.9	1.6	2.46	146
July	4.4	1.6	2.77	170
August	6.5	2.1	3.11	191
September	5.1	1.6	2.71	161
October	2.7	1.6	2.04	125
November	4.2	2.1	2.77	165
December	3.3	2.6	2.64	162
The year	24.0	1.6	5.18	3,750

SAN CARLOS RIVER BASIN.

SAN CARLOS RIVER AT SAN CARLOS, ARIZ.

San Carlos River rises in the mountainous section of the San Carlos Indian Reservation and takes a general southwesterly course to its junction with the Gila at San Carlos. It is an intermittent stream and delivers water to the Gila only at times of flood.

The gaging station, which is located at the Arizona & Eastern Railway bridge, near the mouth of the river, half a mile east of San Carlos, was established August 17, 1910.

The gage is a vertical staff fastened to the west pile of the bridge.

The bed of the stream is composed of shifting sand and silt. The left bank is high and rocky. The right bank is low and subject to overflow. At the bridge from which discharge measurements are made the stream is confined by earth embankments.

Discharge measurements of San Carlos River at San Carlos, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 31[a]	C. C. Jacob	24	19	10.40	36
Sept. 2[b]	do	18	9.1	10.30	16
5[b]	do	12	4.9		7.6
7				[c] 10.20	11
Dec. 19[d]	C. C. Jacob	25	12	10.20	20

[a] Made by wading ¼ mile above gage.
[b] Made by wading 500 feet above gage.
[c] Total flow past gage includes 7.6 second-feet and 3.8 second-feet inflow between first measuring section and gage.
[d] Made by wading 300 feet below gage.

Daily gage height, in feet, of San Carlos River at San Carlos, Ariz., in 1910.

[J. B. Stone, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		10.25			10.2	16		10.0		10.3	10.2
2		10.3			10.2	17	10.0	10.0		10.3	10.2
3		10.3			10.2	18		10.0		10.3	10.2
4		10.3		10.5	10.1	19		10.0	10.0	10.3	10.2
5		10.2		10.6	10.3	20		10.1	10.1	10.3	10.4
6		10.2		10.4	10.3	21		10.1	10.1	10.3	10.3
7		10.2		10.2	10.3	22		10.1	10.1	10.2	10.3
8		10.2		10.1	10.3	23		10.1	10.0	10.2	10.3
9		10.2		10.1	10.3	24	10.0	10.0		10.2	10.2
10		10.2		10.0	10.3	25	10.45			10.2	10.2
11		10.1		10.0	10.2	26	10.35			10.2	10.2
12		10.1		10.0	10.2	27	10.25			10.2	10.2
13		10.4		10.0	10.2	28	10.5			10.3	10.2
14		10.3		10.8	10.2	29	10.3			10.4	10.2
15		10.3		10.4	10.2	30	10.6			10.2	10.2
						31	10.4				10.2

NOTE. From Aug. 17 to 24 the river was dry. Water was below gage for other days for which no gage height record is given.

SAN PEDRO RIVER BASIN.

SAN PEDRO RIVER NEAR LEWIS SPRINGS, ARIZ.

San Pedro River rises in the northern part of the Mexican State of Sonora, flows northward more than 100 miles, and joins the Gila a few miles below the town of Dudleyville, 45 miles above Florence, Ariz. Rising in a region of very light snowfall, the river derives the greater part of its water from the frequent showers of the rainy season. It flows through a sandy bed between high, steep banks, and during the dry season it shrinks to an insignificant stream of clear water, which rises and sinks into the sand with the varying depths of the bedrock. The basin is long and narrow and is bordered by mountains that rise 6,000 feet above sea level.

The gaging station, which is located half a mile below Charleston station on the El Paso & Southwestern Railroad, in sec. 2, T. 21 S., R. 21 E., Gila and Salt River base and meridian, and about 5 miles below Lewis Springs, was originally established about half a mile west of Charleston, 6 miles above Fairbank, on January 27, 1904. The station was discontinued August 31, 1906, and reestablished at the present site October 18, 1910.

The records derived from observations at this station show the amount of water available for storage at the Charleston reservoir site, which has been surveyed by the United States Reclamation Service. The low-water flow of the San Pedro is not sufficient to irrigate the lands now under cultivation.

The gage is an inclined staff on the right bank at the proposed dam site.

Both banks are high and rocky and not subject to overflow. The bed of the stream is composed of sand and is shifting.

Discharge measurements are made from a car and cable about one-third mile above the gage.

Discharge measurements of San Pedro River near Lewis Springs, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 18[a]	C. C. Jacob	14	7.7	4.08	12
Oct. 19[a]	do	14	6.8	4.08	13
Nov. 9[b]	do	11	6.5	4.05	13
Dec. 14[a]	do	12	7.7	4.03	15

[a] Made by wading.
[b] Made by wading one-fourth mile above gage.

Daily gage height, in feet, of San Pedro River near Lewis Springs, Ariz., for 1910.

[M. Clymer, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		4.05	11	4.05	4.04	21	4.05	3.90
2		4.05	12	4.05	4.03	22	4.05	3.90
3		4.05	13	4.05	4.03	23	4.05	3.90
4		4.04	14	4.05	4.03	24	4.05	4.00
5		4.04	15	4.10	4.03	25	4.05	4.00
6		4.04	16	4.08	4.03	26	4.08	4.00
7		4.04	17	4.05	4.03	27	4.12	4.00
8		4.04	18	4.05	3.95	28	4.08	4.00
9	4.05	4.04	19	4.05	3.90	29	4.05	3.95
10	4.05	4.04	20	4.05	3.90	30	4.05	3.95
						31		3.95

SANTA CRUZ RIVER BASIN.

GENERAL FEATURES.

Santa Cruz River rises in the northern part of the Mexican State of Sonora, west of the head of San Pedro River, and flows northward into Arizona. In its upper part the stream flows in a region of rocky canyons and narrow valleys and carries an ample water supply. The waters of the lower portion are finally lost in the sands not far from Tucson. Elevations in the headwater region range from 4,000 to 5,000 feet above sea level.

SANTA CRUZ RIVER NEAR NOGALES, ARIZ.

This station, which is located just below the dam site on Yerba Buena ranch, about 7 miles northeast of Nogales, was established March 22, 1907.

Nearly the entire low-water flow of the Santa Cruz is diverted for irrigation above the station. A small ditch takes out water just above the gage.

The gage is an inclined staff, in two sections, fastened to a large cottonwood tree on the right bank.

The channel is straight for some distance above and below the station. Both banks are of medium height and not likely to be overflowed. At low water the conditions are very unsatisfactory, as the bed is shifting sand.

Discharge measurements at medium and high stages are made from a cable 100 feet below the gage.

The following discharge measurement was made by C. C. Jacob in canal below gage:

November 10, 1910:[1] Width, 1 foot; area, 0.40 square foot; gage height, 3.50 feet; discharge, 0.35 second-foot.

Daily gage height, in feet, of Santa Cruz River near Nogales, Ariz., for 1910.

[J. A. Harrison, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	3.7	3.8	3.7	.....	3.65	16	4.0	3.7	3.7	3.7	3.8	3.35
2	2.7	3.7	3.8	3.7	3.7	3.6	17	3.8	3.6	3.7	3.7	3.8	3.3
3	2.7	5.2	3.8	3.7	3.75	3.6	18	3.8	3.6	3.7	3.7	3.7	3.3
4	2.7	3.9	3.8	3.7	3.75	3.55	19	3.8	3.6	4.75	3.7	3.7	3.3
5	2.7	3.9	3.7	3.7	3.7	3.55	20	3.8	3.6	4.3	3.7	3.7	3.3
6	2.7	3.8	3.7	3.7	.....	3.55	21	4.3	3.5	3.7	3.7	3.7	3.3
7	2.7	3.7	3.7	3.7	3.7	3.5	22	3.9	3.4	3.7	3.7	3.7	3.3
8	2.7	3.85	3.7	3.7	3.7	3.5	23	4.2	3.4	3.7	3.7	3.7	3.3
9	2.7	3.8	3.7	3.7	3.7	3.5	24	4.2	3.5	4.4	3.7	3.7	3.3
10	2.7	3.75	3.7	3.7	3.7	3.5	25	4.0	3.4	3.9	3.7	3.7	3.25
11	2.7	3.7	3.7	3.7	3.7	3.45	26	3.9	3.4	3.7	3.7	3.7	3.2
12	.....	3.7	3.7	3.7	3.7	3.45	27	4.0	3.6	3.7	3.7	3.7	3.2
13	2.7	3.7	3.7	3.7	3.7	3.45	28	4.3	3.8	3.7	3.7	3.7	3.2
14	4.55	3.7	3.7	3.7	3.7	3.4	29	3.7	3.75	3.7	3.7	3.7	3.2
15	4.4	3.8	3.7	3.7	3.8	3.35	30	3.7	3.9	3.7	3.7	3.7	3.2
							31	3.7	3.9	.....	3.7	.....	3.2

SANTA CRUZ RIVER AND DITCHES AT TUCSON, ARIZ.

This station, which is located at Congress Street Bridge, Tucson, Ariz., was established October 15, 1905. The gage-height records were discontinued November 12, 1907, but discharge measurements have been made since then by the students of the University of Arizona under the direction of Mr. G. E. P. Smith, by whom the station is now maintained.

The Manning and Farmers ditches divert practically the entire flow during the low period of Santa Cruz River. These ditches are taken out just above the gaging station, and their flow is determined by current-meter or weir measurements, supplemented by daily records, kept by the ditch managers, of the amount of water contained in each. On April 16 and 17, 1908, a permanent Cippoletti weir was established on the Manning ditch 3 miles below the head gate. This water is used to irrigate lands on the north and south sides of Santa Cruz River in and about Tucson.

Conditions of flow are changeable.

[1] All water diverted from river into canal by earth levee at gage.

The results published herewith were furnished to the Survey by the United States Reclamation Service.

Daily run-off, in acre-feet, of Santa Cruz River at Tucson, Ariz., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1							65					
2							60					
3							55		10			
4		8					50		10			
5	8						40		10			
6	16								10			
7	4								10			
8									10			
9									10			
10									10			
11							20		10			
12							20		5			
13				7			20					
14				14				8				
15		8		14								
16		17		14		10						
17		17		14		10						
18		17		7		3						
19		17										
20		17										
21		17				242					22	
22		17				30					22	
23		8				2,013					22	
24						1,465					22	
25						98					22	
26						60					22	
27						40					22	
28						230					22	
29						90					22	
30						80	320				22	
31						70	40				22	
	28	143		70		4,441	690	8	95		242	5,717

SALT RIVER BASIN.

SALT RIVER AT ROOSEVELT AND SALT AND VERDE RIVERS AT McDOWELL, ARIZ.

Salt River, though considered a tributary of the Gila, is larger both in catchment area and in volume of water carried. It receives the drainage from central Arizona, its principal tributary, the Verde, flowing in a general southeasterly direction from the mountains and tablelands south of Colorado River. The Verde Valley is in Yavapai County, Ariz., on the headwaters of the stream, and extends from a canyon above Camp Verde to a point about 10 miles below the fort. About a mile below the junction of the Verde and 30 miles above Phoenix, the Salt enters the plains of the Gila Valley.

The Salt River project of the United States Reclamation Service provides for the storage of water in a reservoir controlled by the Roosevelt dam, on Salt River at Roosevelt, Ariz., about 78 miles northeast of Phoenix. The diversion of water from Salt River by the Granite Reef dam, about 4 miles below the mouth of Verde River, into the old Arizona canal on the north side of the river and into the South canal on the south side of the river; the enlargement of the

Arizona canal; and the consolidation of the canal systems in the Salt River valley in the vicinity of Phoenix and Mesa into two systems receiving water from the Arizona and South canals. A power plant at the storage dam generates power from stored water in the reservoir and from water delivered from a power canal heading at a diversion dam in Salt River about 19 miles above the storage dam. Other power plants will be established on Salt River below Roosevelt and at drops in canals. A part of the power developed will be used for pumping water for extending the irrigated area and a part will be sold for industrial purposes.

The power-canal diversion dam, the power canal, the power plant, the Roosevelt dam, and the Granite Reef dam are completed; the improvements of the Arizona canal system and the wells for underground pumping are still under construction.[1]

Until the Roosevelt dam was completed (March, 1910) gaging stations were maintained at two points in Salt River basin by the United States Reclamation Service, as follows:

A station on Salt River at McDowell, Ariz., which is located one-third mile above the junction of Salt and Verde rivers, 30 miles northeast of Phoenix, 15 miles northeast of Mesa, and $1\frac{3}{4}$ miles above the Arizona canal diversion dam, was established April 30, 1897.

A station on Verde River at McDowell, $2\frac{1}{8}$ miles above the Arizona canal diversion dam and three-fourths of a mile above the mouth of the river, was established April 20, 1897.

The estimates of monthly discharge for 1910 have been computed from the reservoir records, based on amounts stored and amount drawn for this period. These estimates have been furnished by the United States Reclamation Service.

Monthly discharge of Salt River at Roosevelt and Verde River at McDowell, Ariz., for 1910.

Month.	Run-off (total in acre-feet).			
	Salt River at Roosevelt, Ariz.	Salt River at McDowell, Ariz.	Verde River at McDowell, Ariz.	Salt River at Granite Roof, Ariz.
January	98,760	108,636	219,061	327,697
February	33,562	35,240	28,475	63,715
March	73,545	77,222	79,182	156,404
April	59,348	64,096	49,946	114,042
May	30,179	31,688	8,636	40,324
June	8,072	8,637	3,844	12,481
July	9,510	10,081	7,681	17,762
August	18,093	18,998	19,273	38,271
September	12,596	13,352	13,144	26,496
October	10,475	11,104	11,904	23,008
November	17,489	18,363	19,432	37,795
December	16,839	17,681	18,710	36,391
The year	388,468	415,098	479,288	894,386

[1] Description of Salt River project taken from Ninth Ann. Rept. U. S. Reclamation Service.

AGUA FRIA RIVER BASIN.

AGUA FRIA RIVER NEAR GLENDALE, ARIZ.

Agua Fria River rises in the Prescott National Forest, Ariz., south of the Black Hills, and flows southward to its junction with the Gila, a short distance below the mouth of Salt River. New River, its principal tributary, enters about 11 miles above its mouth. During the greater part of the year New River is a dry wash. From the mountains the Agua Fria flows southward as a clear mountain torrent, but as it enters the plains of the Gila its waters sink into the broad sandy channel. In flood times great volumes of muddy waters pour through the usually dry channel into the Gila.

The gaging station, which is located at the old diversion dam of the Beardsley irrigation project at Camp Dyer, in sec. 28, T. 6 N., R. 1 E., Gila and Salt River base and meridian, 22 miles northwest of Glendale, was established November 10, 1910. The records derived from the observations at this point will show the amount of water available for storage at the proposed reservoir, a short distance above Camp Dyer.

Castle Creek enters about 4 miles above the station.

The diversion dam failed during the flood of 1895 when a portion of the masonry at each end was washed out.

At low and medium stages the stream flows through the larger opening, which is near the right bank. The gage for each channel is painted on the upstream face of the dam at the right of the opening.

At low water the channel changes slightly on account of the shifting sand in the bed of the stream. At high stages the dam acts as a permanent control.

At low and medium stages discharge measurements are made by wading near the dam. No equipment has yet been installed for making measurements at high water.

Discharge measurements of Agua Fria River near Glendale, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 12[a]	C. C. Jacob	.....	1.8	(*b*)	2.2
30	Clapp and Jacob	6	2.2	.....	2.3
Nov. 5[c]	Jacob and Harris	22	18	.....	37
6[d]	C. C. Jacob	7.7	8.6	.....	13
8[e]	.....do	3.9	2.9	21.2	4.6
Dec. 7[e]	.....do	3.6	2.9	21.2	4.6

[a] Made by floats, coefficient used 0.75.
[b] Water surface 2.65 feet below south-east corner of west channel through dam, highest voussoir.
[c] Measurement made 300 feet above dam from trunk of cottonwood tree.
[d] Discharge measured in two channels at dam. Water passing through culvert and over bottom of north gap.
[e] All water flowing through north culvert.

Daily gage height, in feet, of Agua Fria River near Glendale, Ariz., for 1910.

[J. M. Heath, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		21.25	11	20.4	21.2	21	21.2	21.2
2		21.25	12	20.4	21.25	22	21.1	21.2
3		21.25	13	20.7	21.2	23	21.1	21.25
4		21.2	14	22.95	21.2	24	21.1	21.25
5		21.2	15	22.7	21.2	25	21.1	21.22
6		21.2	16	21.9	21.1	26	21.18	21.2
7		21.2	17	21.55	21.1	27	21.4	21.2
8		21.2	18	21.35	21.15	28	21.3	21.25
9		21.2	19	21.3	21.2	29	21.3	21.25
10	20.4	21.2	20	21.22	21.2	30	21.3	21.2
						31		21.22

HASSAYAMPA RIVER BASIN.

HASSAYAMPA RIVER NEAR WICKENBERG, ARIZ.

Hassayampa River rises south of the Sierra Prieta in the Prescott National Forest, and flows southward to its junction with the Gila about 25 miles below the mouth of the Agua Fria.

The mean annual precipitation at the headwaters of Hassayampa and Agua Fria rivers is about 18 inches; at the junction of these rivers with the Gila it is about 6 inches. The high slopes of the basin usually support a small amount of pine, fir, juniper, and oak having some commercial value. On the lower foothills there is a scattered growth of cacti, chaparral, and palo verde. Like the Agua Fria the Hassayampa is subject to violent freshets, whose waters reach the Gila only at times of flood; at other times the stream sinks into the sands.

The gaging station, which is located half a mile below Brill station on the Atchison, Topeka & Santa Fe Railway, about 4 miles below Wickenberg, in sec. 20, T. 7 N., R. 4 W., Gila and Salt River base and meridian, was established November 23, 1910.

A small ditch diverts water for irrigation at Wickenberg. No important tributaries enter below the station, which is about 45 miles above the mouth of the river.

A vertical staff gage is bolted to the bedrock on the west bank of the stream about half a mile below the Brill ranch house.

The channel is straight for some distance above and below the station. The banks are low, and at high stages the river spreads to the base of the foothills. The bed of the stream is composed of sand and gravel and is very unstable. The location of the low-water channel changes with each flood.

Discharge measurements are made by wading near the gage.

Discharge measurements of Hassayampa River near Wickenburg, Ariz., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Oct. 11[a]	C. C. Jacob	.....	2.0	[b] 4.50	5.4
Oct. 31[c]	Clapp and Jacob	6.0	2.2	[b] 4.70	4.0
Nov. 22[d]	C. C. Jacob	1.5	.5	.. ..	.7
Nov. 23[e]	.....do	7.0	2.9	4.80	4.8

[a] Made by floats 3 miles below Wickenburg.
[b] Water surface referenced and later gage height deduced.
[c] Made by wading ½ mile below ranch house, 3½ miles below Wickenburg. No water flowing in river channel at Wickenburg. Water rises a short distance above ranch house and some distance below Wickenburg.
[d] Water emerges from sand at low stage at upper end of box canyon, flows through canyon, and again sinks into sand. Measurement made at lower end of box canyon.
[e] Made ½ mile above Brill's ranch. No water flowing in river at Wickenburg.

Daily gage height, in feet, of Hassayampa River near Wickenburg, Ariz., for 1910.

[A. S. Nilson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	4.8	11	.....	4.7	21	.....	4.65
2	.....	4.8	12	.....	4.7	22	.....	4.7
3	.....	4.8	13	.....	4.7	23	4.8	4.7
4	.....	4.8	14	.....	4.7	24	4.75	4.7
5	.....	4.8	15	.....	4.7	25	4.8	4.7
6	.....	4.8	16	.....	4.7	26	4.8	4.7
7	.....	4.8	17	.....	4.7	27	4.8	4.7
8	.....	4.8	18	.....	4.7	28	4.8	4.7
9	.....	4.75	19	.....	4.7	29	4.8	4.7
10	.....	4.7	20	.....	4.6	30	4.8	4.7
						31	.....	4.7

SALTON SINK BASIN.

Stream-flow data for the Salton Sink basin, heretofore presented with Colorado River data, will be found in the report on the Great Basin (Water-Supply Paper 290), of which it logically forms a part.

MISCELLANEOUS MEASUREMENTS IN COLORADO RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in the Colorado River drainage basin during 1910. They are arranged by drainage basins in downstream order.

Miscellaneous measurements in Colorado River basin in 1910.

Green River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 7	Yampa River	Green River	Hayden, Colo	.....	281
Sept. 6	Battle Creek	Little Snake River	At mouth in sec. 16, T. 12 N., R. 88 W.	.....	[a] 4
July 16	Savery Creek	.....do	At mouth 1 mile above Wyoming-Colorado State line.	.....	[a] 6
Sept. 6	.....do	.....do	.....do	.....	[a] 6
Nov. 7	.....do	.....do	.....do	.....	28
Nov. 9	Fourmile Creek	.....do	At Wyoming-Colorado State line	.....	2.8
Aug. 24	Strawberry River	Duchesne River	At old gaging station, Utah	5.70	31.5
25	Price canal	Price River	Price, Utah	.....	18.2
July 24	Right canal	Ferron Creek	Above gaging station near Ferron, Utah	.....	10.8
24	Left canal	.....do		.....	30.2

[a] Estimated.

Miscellaneous measurements in Colorado River basin in 1910—Continued.

Grand River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
July 4	South Fork, Grand River.	Grand River	100 yards above gage at Lehman, Colo.	4.9	152
Sept. 8	do	do	At bridge at Lehman, Colo.		40
July 3	East Inlet, Grand Lake.	North Fork Grand River.	50 yards above mouth at Grand Lake, Colo.	4.20	74
Sept. 9	Willow Creek	Grand River	Granby, Colo.		14
Mar. 10	Vasquez Creek	Fraser River	Vasquez, Colo.		*a* 2.5
Oct. 15	Blue River	Grand River	300 yards below Summit County Power Co.'s plant, and 1 mile below Dillon, Colo.		113
14	do	do	Below mouth of Rock Creek, 8 miles below Dillon, Colo.		117
Sept. 14	do	do	At Kremmling-Radium highway bridge near Radium, Colo.		*b* 232
Mar. 10	Sheep Creek	do	Gore, Colo.		*a* 4
Apr. 17	do	do	do		*a* 1
Mar. 10	Sheephorn Creek	do	At mouth near Radium, Colo.		*a* 1
10	Piney Creek	do	Near State bridge near McCoy, Colo.		*a* 3
10	Rock Creek	do	Near Crater, Colo.		*a* 8
16	Gypsum Creek	Eagle River	300 feet above mouth from footbridge, near Gypsum, Colo.		50
May 19	West Mamm Creek	Grand River	2 miles above Selby's ranch near Rifle, Colo.		*a* 10
19	Selby's ditch *c*	West Mamm Creek.	A short distance above gaging station at Selby's ranch near Rifle, Colo.		2.4
19	Quaking Asp Creek	do	Near mouth opposite Selby's ranch near Rifle, Colo.		*a* .1
19	Rifle Creek	Grand River	At footbridge 2 blocks north of Denver & Rio Grande R. R. depot at Rifle, Colo.		54
Nov. 22	Cochetopa Creek	Gunnison River	About 2 miles above Sillsville, Colo.		28
Oct. 27	West Naturita Creek.	San Miguel River.	Above junction with East Naturita in sec. 31, T. 43 N., R. 13 W.		*a* .5
27	East Naturita Creek.	West Naturita Creek.	Above junction with West Naturita in sec. 29, T. 43 N., R. 13 W.		*a* 1
27	Lone Cone Creek	Naturita Creek	Above point of diversion of Lone Cone ditch in sec. 25, T. 43 N., R. 13 W.		*a* 1
26	Basin Creek	San Miguel River	At Stone Cabin reservoir, Colo., in sec. 11, T. 44 N., R. 16 W.		.01

Escalante River basin.

Oct. 17	Pine Creek	Escalante River	Escalante, Utah	2.66	10.9
Aug. 13	do	do	do	1.76	14.4
May 14	do	do	200 feet above Escalante Creek		50.7

San Juan River basin, Colo.

Oct. 21	San Juan	San Juan River	Near Shiprock, N. Mex.	4.00	2,390

Virgin River basin.

June 17	Santa Clara	Virgin River	Near Hunt's ranch, Utah	3.35	20.7

a Estimated. *b* Float measurement. *c* Ditch diverted from West Mamm Creek.

Miscellaneous measurements in Colorado River basin in 1910—Continued.

Gila River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Nov. 18	Buckhorn Creek	Duck Creek	Silver City-Mogollon road crossing, 8 miles above Cliff, N. Mex.		[a] 1
Sept. 19	do	do	do		[a] 2
Jan. 30	Whitewater Creek	San Francisco River.	At road crossing at Glenwood, N. Mex.		7.4
May 6	do	do	do		7.2
Sept. 19	Dry Creek	do	Near Meter's ranch, 12 miles south of Glenwood, N. Mex.		0
Nov. 18	do	do	do		0
18	Little Dry Creek	do	At Silver City-Mogollon ford, 12 miles south of Glenwood, N. Mex.		0
Sept. 19	do	do	do		0

Las Vegas Wash.

Sept. 6	Artesian well		Las Vegas, Nev		0.43
7	Every		do		1.56

[a] Estimated.

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